



The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY

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(For Details, see over.)

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VOL. XI.

VISITS TO BARENTS AND KARA SEAS, WITH RAMBLES IN NOVAYA ZEMLYA, 1895 AND 1897.*

By Colonel H. W. FEILDEN.

THE paper which I have the honour of reading to-night contains no thrilling narrative of arctic adventure, no conflicts with "thick-ribbed ice," no dangers or perils which are not incidental to an ordinary yacht voyage in the arctic seas, and no suffering from want of food or the vicissitudes of climate. So far our story will be humdrum enough.

First of all, I must apologize for reading this paper; properly my colleague, Mr. Pearson, ought to have done so, as he was the originator of both voyages and paid for them. The interesting photographic slides which illustrate the voyages were all taken by Mr. Pearson, and represent an enormous amount of labour and hard work.

The chief reason that induced me to draw up this paper was to bring to your notice the very abnormal conditions of the floating ice, in Barents sea, the Kara sea, in the polar ocean around Franz Josef Land, about Spitsbergen, and away to the eastward of the Yugor straits as far as the mouth of the Yenisei, during the summer of 1897. Curiously enough, on almost the opposite side of the globe, in the polar sea beyond the straits of Bering, the ice conditions appear to have been very unfavourable during the past season. We learn that a considerable part of the American whaling fleet has been caught by the unusually early closing of the ice-pack on the Alaskan shore, to the eastward of Point Barrow, and grave fears are entertained that these whaling ships will be destroyed by the polar pack, though it seems probable that the crews will be saved by wintering with the natives of that coast.

It is a matter for congratulation that during the past season,

* Read at the Royal Geographical Society, December 13, 1897. Map, p. 461.
No. IV.—APRIL, 1898.]

over the great area extending from Spitsbergen to the Yenisei, British explorers, whalers, yachtmén, and traders have been pursuing their callings at various points, so that we shall rely for a description of this very remarkable ice-season, not on one set of observations, but on many. There are the voyages of the Jackson-Harmsworth yacht *Windward* to and from Franz Josef Land; the Dundee whalers pursuing their business in the same quarter of the polar sea; Mr. Arnold Pike, in the *Victoria*, passing down Hinlopen straits and effecting an easy landing on Wiche's island; Mr. F. W. L. Popham, in the *Blencathra*, conducting a fleet of steamers through Yugor straits to the Yenisei; and Mr. Pearson passing in the *Laura* through the Matyushin shar, finding no ice in the Kara sea and along the east shore of the north island of Novaya Zemlya, as far north as Pachtvssoff island in $74^{\circ} 24'$. But, in order to make it clear to you how abnormal the ice-conditions were in Barents sea this summer, I must ask you to accompany me for a few minutes in our preliminary voyage to Novaya Zemlya in 1895. Mr. Pearson for this trip chartered the English yacht *Saxon*, a small but staunch little steamer of some 50 tons net register and 117 tons yacht measurement. The drawback to this vessel was her small coal-carrying capacity, but she made up for her deficiency in size by the vivacity of her performances; she was certainly the most lively little craft I ever went in. I do not think any of us who sailed in her that summer in Barents sea will ever forget the shakings and knocking about that we received.

I pass over a glorious run through the fjords of the west coast of Norway, which so many of you know well, and those who do not ought to, for it embraces the finest scenery of its kind in Europe, and take you at once to Vardö, merely remarking that the veteran ice-navigator, Captain Johan Kjeldsen, joined us at Tromsö as our ice-master. Leaving Vardö on June 14, our course was laid for the north-west of Novaya Zemlya. Two days after leaving Vardö, on the evening of June 16, we passed through a good deal of loose ice, and at midnight were brought up by heavy pack, which extended north-west, north, and east without a break, and no sign of a water-cloud. Towards those points of the compass an ominous yellow ice-blink hung over the ice-pack. We were then in 72° N. lat. and 45° E. long., the nearest part of Novaya Zemlya being about 120 miles distant. During the two next days we worked along the edge of the ice in a south-easterly direction; every likely bight was entered, and in some places these indentations in the pack-ice were followed up for miles, but invariably they ended in blind leads, and we were brought up by impenetrable ice. On June 17 we reached our nearest to Novaya Zemlya, on the 71st parallel, Goose Land being 80 miles distant. Still working south, and hugging the edge of the pack, we found ourselves on June 19 in lat. 70° N., but the trend of the ice had forced us to the westward some 120 miles from the shores of Novaya Zemlya. At this stage of our

voyage we were confronted with the difficulty always hanging over us, viz. the paucity of our coal-supply. The *Saxon* at this juncture had only enough fuel left to take her back to Vardö, whilst little dependence could be placed in her sailing. Our attempt to reach Novaya Zemlya had to be abandoned; we shaped our course for the Murman coast of Russian Lapland, entered the Ukanskoe river, to the westward of Sviatoi Noss, and went into camp near the Lapp summer settlement of Lutni. In the mean time the *Saxon* returned to Vardö for coal.

We passed a delightful week at Lutni, and, if time permitted, I should like to tell you about the Lapps, and their reindeer, and their salmon-fishing, and their houses, and their modes of living, and of the birds and



AUKERY, NAMELESS BAY, NOVAYA ZEMLYA.

(From a photograph by H. J. Pearson, Esq.)

animals and the natural features of that country, and the flowers, and many other things. On June 28 the *Saxon* had returned from Vardö, and we left Lutni. In the afternoon we were abreast of Cape Kanin, which marks the eastern entrance to the White sea, a low uninviting tundra-land, then streaked with patches of snow. Early the next morning we sighted the island Kolguev, and by 7 a.m. were abreast of its northern extremity. Shortly after we saw the ice-pack on our starboard quarter stretching north and south in a solid mass, and resting on the north end of Kolguev. We kept close to the edge of this pack, working to the north-north-west; a midnight observation on July 1 placed us in $71^{\circ} 8' N.$ lat., our approximate longitude being $49^{\circ} 5' E.$

On July 2, still sailing north-westerly along the edge of the ice, we

met with a broad lane or lead between the ice-fields, opening up in the desired direction. With full steam, and every bit of canvas set, we pressed on, for the wind was also favourable. At midnight the high lands of Novaya Zemlya were visible, and in a couple of hours we were within 8 or 10 miles of the low shores of Goose Land. There our further progress was stopped by a close pack, which stretched some 8 miles wide along the entire length of Goose Land, and joined with the main fields of ice which lay on our port and starboard, and through which we had run some 40 miles.

Some narrow leads and cracks showing in the ice to the north-west, the yacht was worked into the pack in that direction, in the hopes that we might get round North Goose cape, and that open water might be found beyond. By the morning of July 3 we had pushed into the pack as far as lat. $72^{\circ} 10'$, but we had been edged out nearly 30 miles from the land. We had, therefore, not improved our prospects, but, on the contrary, as the narrow leads we had steamed through were constantly shifting and closing, we were in danger of being beset, and we had consequently to retrace our steps. This was done, and after some difficulty in pushing through narrow barriers of ice, which taxed to the utmost the weak steam-power of the *Saxon*, we entered into a large space of open water, which lay between the pack that girdled Novaya Zemlya and the main ice-fields of Barents sea to the westward. For the rest of that day we moved slowly along the edge of the pack that barred us from the land. It was plain that great movements were taking place in the ice-fields of Barents sea. To our westward, a broad channel some 3 or 4 miles wide opened up. Evidently the entire pack was loosening off the land, and moving forth for its annual break-up in Barents sea. Our stock of coal was now reduced to so low an ebb that we had no alternative but to retreat again. With a favouring wind and a full head of steam, we ran down the channel of water to the south-west at a speed of 9 knots, and in three hours had cleared the ice on our starboard, but still kept it on our port side all the way to the island of Kolguev, which we sighted on the evening of July 4.

On July 5, under very favourable circumstances, we ran down the west side of Kolguev, and made a landing near the mouth of the Gobista river. Our camp equipage and stores were put on shore in all haste, but none too soon, for just as the crew and boats returned to the yacht, and the "farewell" had been hoisted and the *Saxon* bore away for Vardö, the wind had arisen, the waves came thundering on shore, and for the next ten days there was never a time that a boat could have communicated with us. During three days of our stay, the ice-pack came down from the northward and surrounded the western side of Kolguev. I should like to give you some account of this dreary, melancholy island, fog-environed and wind-tormented, but time will only permit a few words. In its scenery there is not one redeeming feature, no mountains,

no brawling streams, no woods, no rocky cliffs to ennoble the view. Its entire western shore, from the mouth of the Gusina river to that of the Gobista, is a long straight line of mud and clay bluff, running nearly due north and south. These bluffs rise to a height of about 100 feet at the north-west end of the island, but the beds of which they are composed sink by an almost imperceptible dip from north to south until at the mouth of the Gobista the summit of the bluff is not more than 40 feet above sea-level, and this dip continues in the same direction, for at the mouth of the Kriva river the land almost merges with the sea. Kolguev is, in fact, a recent upheaval of a part of Barents sea, and no doubt gives



DRIFTWOOD, CAPE MATIUSELA, WAIGATS.

(From a photograph by H. J. Pearson, Esq.)

us an accurate representation of the deposits which rest below the waters over a wide surrounding area.

Kolguev is of considerable interest to the naturalist, for, as far as I know, it is the only island of Europe that we can be assured has not had any connection with the mainland since its recent emergence from the surrounding ocean. Consequently its entire flora and fauna must be due to comparatively recent immigration, and the fact that we found earthworms and three species of fresh-water mollusca there is a remarkable proof of how these invertebrates can be transported by natural agencies across the sea. I have a great inclination to linger over this gloomy but to me most interesting island, with its nesting grey plovers,

and little stints, and Bewick's swans, and its delightful flora, but we must hurry on.

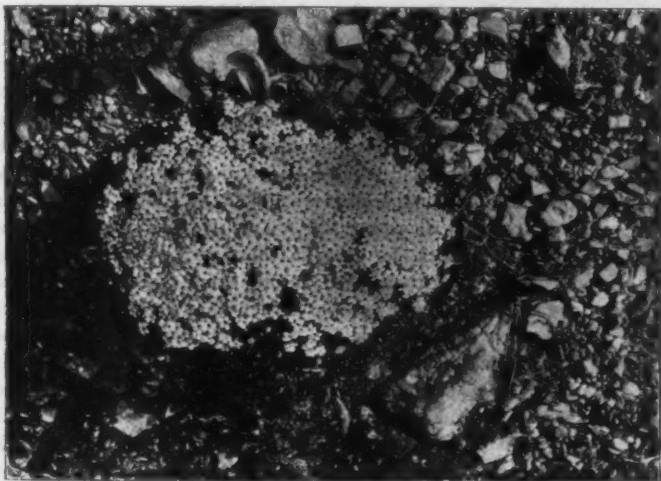
On the morning of July 16 the *Saxon* returned from Vardö and anchored off the mouth of the Gobista river. Three hours after we were again steaming northward on our third attempt to reach Novaya Zemlya. Rounding the north of the island, we found that a marvellous change had taken place during the past ten days. The endless fields of pack-ice which before extended from Kolguev to Novaya Zemlya had entirely disappeared, now and again we passed a sodden dirty fragment of ice rapidly melting, the fog had gone, and in bright sunlight and with a favouring wind we made the northern entrance of the Kostin schar on the evening of July 17.

We spent the next ten days in visiting the islands in the Kostin schar, exploring the inland waters of the lake of Nekwatowa, and in rambles over Goose Land, leaving the shores of Novaya Zemlya on July 27, and returning direct to Norway.

I have inflicted this summary of our 1895 voyage on you with the object of showing the position of the Barents sea ice in an average summer; but all of us who have voyaged much in arctic seas know how uncertain it is to lay down beforehand, with the smallest likelihood of our predictions being verified, the extension or position of the ice-fields in any given summer season. A few words as to the nature of the Barents sea ice: I speak under correction from men of greater experience. It appears to me that the ice I have met in Barents sea has two very distinct characteristics. There is a northern pack of tolerably heavy oceanic ice, which apparently comes down from between Franz Josef Land and Novaya Zemlya. This ice makes a formidable pack, very much the same as that met with to the north and north-east of Spitsbergen. It does not compare, however, in thickness with the ice that comes down the east coast of Greenland and round Cape Farewell, nor with the ice that comes down Smith sound, or which is to be met with in the polar ocean to the north of Greenland and Grinnell Land. The other description of ice is very different in its nature, and I think is the winter's ice that has been formed between Cape Kanin, Kolguev, and the island of Waigats, and along the shores and in the rivers of the mainland of Russia. The floes are not as thick as those forming the northern pack, but the peculiarity about it is its dirtiness; the floes and hummocks of which it is made up are covered with mud, shingle, and earth. We have sailed for miles along the edge of this pack, and noticed the same features. Later on I will refer more fully to this subject, for I cannot but think that this annual transport of immense quantities of land *débris* to the floor of the ocean must have considerable physical effects.

During 1896, Mr. Pearson, contemplating a sea-voyage to the arctic shores of Russia, endeavoured to find a suitable vessel at home, but,

failing in this, went over to Norway and chartered a Norwegian sailing vessel that had been employed in the North Atlantic whale fishery. This ship, about 160 tons register, was thoroughly strengthened, fitted with auxiliary steam power, and renamed the *Laura*. Our old friend Kjeldsen was given the command, and he selected his own crew from amongst the experienced arctic sailors of Tromsø. We sailed under the Norwegian flag. I may here say that the *Laura* proved a most commodious and suitable ship for the service required, and that no one could wish to sail with a better or more obliging crew than our Norwegians. Accustomed to annual trips to Spitsbergen and Novaya Zemlya in their hunting-sloops, these men are thoroughly acquainted



SILENE ACAULIS, WAIGATS.

(From a photograph by H. J. Pearson, Esq.)

with every shift and turn of the ice, and the vicissitudes of arctic work. Captain Kjeldsen's career and character is so well known amongst all those who take an interest in the doings of the brave Norsk skippers who sail from Tromsø and Hammerfest to the icy seas, that no words of commendation from me could add to his reputation.

On June 4 of the past summer we arrived at Bergen, and went on board the *Laura*. Our party consisted of Mr. H. J. Pearson, Mr. F. Curtis of Guy's Hospital our medical officer, and myself. We sailed the next day for Tromsø. On June 12 we let go our anchor in Tromsø harbour. From Tromsø we steamed to the island of Skaaro, where Mr. J. Gjaever, our vice-consul, and from whom Mr. Pearson had chartered

the vessel, has a large whaling establishment. There we took in coal from the s.s. *Esk*, direct from England. The steam-petroleum launch which had been supplied to the *Laura* proving quite useless, it became necessary to exchange it for a large steam-launch belonging to Mr. Gjøever, which was lying at Skaaro. It was too large to be taken inboard, so it had to be decked over with canvas and towed. Many were the shakings of heads and ominous predictions about this venture. In the end they were all falsified, and the launch returned to Norway in safety, after doing most useful work; indeed, without a steam-launch, not a tenth of the excursions we made could possibly have been accomplished.

Leaving Skaaro on June 17, we essayed to round the North cape, but meeting a stiff north-easterly gale, which we struggled with for twenty-four hours, we had in the end to give in, and take the inside passage between the island of Maagero and the mainland. Calling in at Honnings Vaag, a considerable fishing station on that island, we posted our letters and sent off wires, and then steered our course to the eastward. June 22 opened with a cloudless sky and serene and beautiful weather, the prevailing east wind changed into the south-west. All sail was set. The shade temperature was 60° Fahr., in the sun 80° Fahr. The ship was dressed with every flag we could muster. At mid-day we fired a salute of twenty-one guns on the poop from our small arms. The Norwegian crew of their own accord came aft, and gave three ringing cheers for "the good Queen," which they repeated again and again. They afterwards sat down to a good dinner, and our gracious sovereign's health was drunk amidst great enthusiasm.

Early in the morning of the 25th we sighted Kolguev, the sea calm, weather warm and misty; we were within 3 miles of its south-west end when we picked up the island. During the remainder of the day we coasted along its northern and western shore. Kolguev looked as ugly and forbidding as usual, but there was far less snow lying on it than in July, 1895, and not a speck of floating ice in its neighbourhood.

After rounding the north end of Kolguev we were surprised to see no ice; the weather continued very warm, hardly any wind, with occasional banks of fog. We set our course for the island of Dolgoi. On the morning of June 27 we were abreast of the great range of sand islands that fringe the embouchure of the Pechora river, but too far out—some 30 miles—to have even a glimpse of that low-lying land. The weather was perfect; temperature in shade, 52°; of the surface water, 50°. It was pleasant to wash on deck, for the water was brackish, and of a brown peaty colour. The great river had awakened into life, and was pouring its volumes into the icy sea. All around the ship, trees, branches, roots, the tribute of Russian forests, were floating broadcast. It is difficult to realize, until brought face to face with the fact, the great ameliorating influence which the discharge of the mighty rivers

of Asia, America, and Europe into the arctic sea must exert on the polar ice and over the polar area.

However, there must be an end to sailing on halcyon seas in every part of the world, and at mid-day, on June 27, we came up to the ice, extending north and south on the meridian of 57° . We ran through some stream ice, and, finding the pack beyond quite impenetrable, we tied up to a large floe and filled up our water-casks. Then we moved slowly under steam along the edge of the pack to the south-west, hoping to find a land-water; but the ice continued across the main entrance to the Pechora delta, and was piled up on the Gouliaieff sandbanks, so there was no road for us that way. Being quite satisfied on that point, we retraced our course along the edge of the pack, and by mid-day of June 28 we were almost in the same position as we had been the day before—namely, N. lat. $69^{\circ} 40'$ and $57^{\circ} 12'$ E. long. The ice we encountered was extremely dirty, covered with gravel and silt; many logs, branches, and trunks of trees were scattered over it. It was of no great thickness, perhaps 8 feet at most; but when pack-ice is broken up and pushed into hummocks and ridges, it gets piled up many feet above its real level of flotation, and gives an impression of thickness far beyond the reality. The sea was like a mirror, of that oily character and absolute smoothness which I have never seen save when steaming through ice in a calm. Such a day is one of the great charms of the arctic seas. The large and handsome king eiders were not uncommon, and my companions shot several of them. All of these birds had their gullets crammed with unbroken *Mya truncata* an inch and more long, and in some cases large *Macra*, as well as crustaceans, not in the least digested, showing that these birds were getting their food on the spot over which they were diving; as there are no soundings of less than 10 fathoms for miles from where the birds were feeding, it seems that these ducks were popping down to a depth of 60 feet or more for every mouthful! In the afternoon we passed beyond the beautiful sunlight into banks of fog; then came a northerly wind and cold grey fog. We kept along the edge of the pack at the distance of a good cast with a salmon rod; the northerly wind was jamming it up like a wall, and as the waves broke over it the ice-fragments swayed and staggered, and rattled with that peculiar gruesome sound that angry ice affects. What contrasts unfold themselves in these arctic seas! One moment nature basking in warm sunlight and perfect repose, the next everything weird, wild, and melancholy. I am puzzled how to account for the extreme dirtiness of this southern pack, for, in addition to the patches of gravel and earth and silt that lay here and there upon it, it was covered broadcast with a dirty mantle. I think that must result from the extreme shallowness of these seas. When a storm arises the bottom is probably churned up, and the muddy water is washed over the broken floes, leaving a coating of sediment.

We continued coasting along this southern pack, hugging each point, and making north-east whenever we could. It was a dirty night, with fog, sometimes dense; then it lifted, at midnight it cleared, and early in the morning of June 29 we saw land, the hilltops rising like black hummocks above the ice-pack. We at once recognized our position, that we were in the entrance of the Kara straits, and that the black hummocks were the islands at the mouth of Dolga bay, in the north end of Waigats. There were 2 or 3 miles of stream ice, then a mile of close pack to push through between us and open water in Dolga bay. Being determined to make land if possible, we put the ship at the ice, and rammed and charged and pushed; all hands with long poles were pushing and shoving, on and off the ship. Finally our efforts succeeded, and we gained the clear water at the entrance of the bay. I have told you that we had a steam-launch in tow, and during this skirmish with the ice the treatment this poor craft received was very comical. It was decked over with canvas like a Noah's ark, and to see the poor thing dragged over hummocks 6 and 8 feet high was very painful to our feeling. Sometimes it was on an even keel, then dragged along on its beam-ends; at times it was half buried in the ice; but, wonderful to relate, the hawser did not part, and our invaluable launch tumbled into the water of Dolga bay like a harried duck regaining a pond.

I think we were very pleased to gain a safe refuge in Waigats so easily—certainly as much by luck, owing to the friendliness of the ice, as by good guidance. For I am not aware that along the whole coast-line of that island, with the exception of some bights in the straits of Yugor, there is a single safe anchorage but Dolga bay, when the pack-ice is moving up and down in the early part of the season. Though there are several ice-worn islets, with ugly reefs on both sides of the entrance to the bay, yet the centre is clear of dangers, with 20 fathoms of water, and quite easy to make. We anchored in decidedly the best spot, immediately under the south side of the innermost island on the east side of the bay, in $6\frac{1}{2}$ fathoms, clay bottom. I am somewhat precise in these sailing directions, for neither the English nor Russian charts give any particulars, nor can I find that any exploring ship previous to ourselves has anchored in Dolga bay.

As we had been thwarted in our intentions to make Dolgoi island, and from there pass to the mainland of Arctic Russia, which was Mr. Pearson's object when we left England, it was felt desirable that we should make the best of our alternative landing on Waigats.

It is remarkable how very little is really known about an island that, for the past three hundred years, has had such frequent mention in the annals of north-eastern discovery. Scores of expeditions, Dutch, English, Swedish, and Russian, have touched at its shores, but until Mr. Frederick Jackson, in the autumn of 1894, made the complete circuit of the island in company with Samoyeds, and gave us his interesting

experiences,* I am not aware that any description had been given of the interior of the island.

As we remained for ten days in Dolga bay, and made many trips in the steam-launch to various parts of the coast, and also wandered far and wide inland, we obtained an experience of the north end of the island in summer which may be worth recording, for Mr. Jackson's visit was made in autumn, when the snow lay on the ground, and consequently we had better opportunities for observation than he had. The valleys of Waigats are so well covered with herbage, that in June and July, when the snow has generally disappeared, and only remains in scattered patches on northern slopes or hollows, it is difficult to realize



BEAR BAY GLACIER, LUTKE LAND.
(From a photograph by H. J. Pearson, Esq.)

what a terribly severe winter climate reigns there. Waigats has no glaciers—no attempt, indeed, at any permanent snow deposit. There are no mountain ranges; the highest ridges in the north end may be 300 feet, but the greater part do not exceed 200 feet and less. The island sinks gradually towards the south. The rock formation of Waigats consists chiefly of slates and limestones, which have undergone great upheaval and subsequent denudation. They are nearly vertical, and their strike is from north-west to south-east. Consequently the ridges are formed by the line of strike, and run in the same direction. The

* 'Great Frozen Land' (London: 1895).

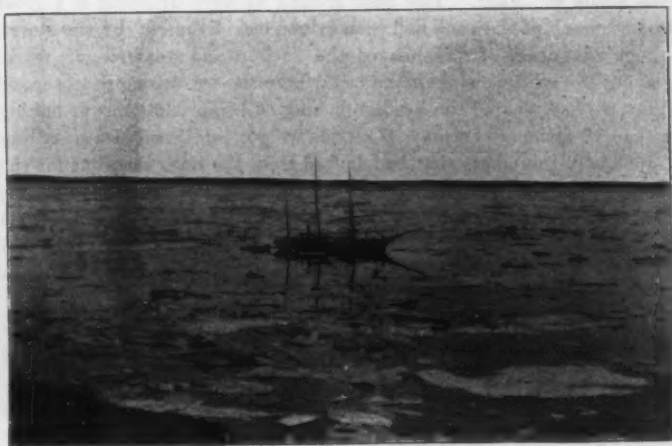
troughs or valleys between the ridges are covered with a thick layer of marine boreal clay, containing the shells of *Mya truncata*, *saxicava*, *astarte*, and other mollusca now occurring abundantly in the surrounding sea. Everywhere around we can trace the signs of very recent emergence from the ocean. The modern island of Waigats is, geologically, an upheaval of yesterday. This clay deposit in the valleys and troughs is dotted over with tarns and lakes. Many of these are surrounded with peaty growths. There are consequently three distinct soils—that of the disintegrated rocky ridges, then the predominant marine boreal clay, and the more local peat formations resting on the clay. Each of these divisions of soil have their special flora. The flowers of Waigats make up for the comparative paucity of species by the lavish growth of individual plants. Nowhere in the arctic regions have I seen such wonderful masses of colour; one may wade through acres of blossoming plants a foot high, veritable arctic flower-gardens. In the end of June and beginning of July, *Matthiola nudicaulis*, a delicate pink-blossomed ciferous plant, with the arctic yellow poppy and louseworts of many colours, from glorious yellow to rich pinks, are spread broadcast. *Polemonium caeruleum*, with its grand blue blossoms, coloured acres; *Saxifraga hirculus*, with its yellow flowers, is perhaps the most abundant and widespread of the plants. Buttercups of several species are predominant, carpeting wide areas; one water-loving species, *Ranunculus Pallasii*, floating on meres and tarns like a miniature water-lily, and pervading the air with its fragrance. *Silene acaulis* is likewise most abundant, growing in clumps and bosses on dry spots and the sides of the ridges among the disintegrated rocks, in such dense masses as to give colour to the cliffs. Then comes the alpine forget-me-not, with its lovely colourings, varying from white to the purest cerulean blue. My words fail, I know, to give any adequate description of the immense charm attaching to this arctic flora. There are no trees, in the ordinary acceptation of the word, growing on Waigats, but two or three species of willow are abundant; they are, however, only stunted bushes, not growing higher than a foot or a foot and a half.

The tarns and lakes I have spoken of are the resort of many wading birds and divers. We found the little stint (*Tringa minuta*) breeding abundantly, and Mr. Pearson added to his collection the finest series of the eggs of this bird that has ever been brought together. We found that singular bird the ruff (*Machetes pugnax*), and the dotterel (*Eudromias morinellus*) makes Waigats its summer quarters and breeds there. The peregrine falcon nests in the cliffs, and so does the large rough-legged buzzard (*Archibuteo lagopus*). These are interesting facts for ornithologists.

During our stay at Dolga bay we met no Samoyeds, but at Voronoff Noss they have a more or less permanent station. We saw there many sealskins pegged out to dry, and accumulations of blubber ready for

transport. Subsequently the Russians of Khabarova told us that small parties of Samoyeds generally winter at Bolvanski Nos and Voronoff Nos, as those are the best stations for winter hunting in the island. On the eastern side of Dolga bay we came across an old sacrificial pile of the Samoyeds; very ancient ice-bears' skulls were the chief garniture of the spot, but a decayed gunstock and other odds and ends showed that offerings had been made there in comparatively recent times.

On July 4 the pack-ice which had been moving up and down the west side of Waigats came swirling into Dolga bay, completely filling it, and packing closely around the ship, but it was not heavy enough to give us the slightest anxiety. It curtailed our launch expeditions, and



LAURA, IN DOLGA BAY, WAIGATS.

(From a photograph by H. J. Pearson, Esq.)

obliged us to drag our boats over the pack to and from the shore. This pack-ice, to a great extent, moved in and out of Dolga bay under the influence of wind and tide. As we scrambled over this dripping, rotting, and melting pack, we took notice of the enormous quantities of detritus deposited on the surface of the floe-pieces—stones, gravel, and mud. As the ice-rafts decay this material is thrown to the bottom. It is impossible to form any estimate as to the amount of material transported annually into Barents sea from the mainland, but it is prodigious, and in the course of ages must have exercised great influence in decreasing the depths of that sea. As the valley muds and clays of Waigats and Novaya Zemlya are precisely of the same character as those which come up in the dredge or on the flukes of the anchor from the bays and fiords,

there can be no doubt that they were deposited by the same process as we see progressing to-day.

On July 8 there was a thunderstorm. The day had been hot and close, with a warm south-east wind; in the evening the rain came down on us as we were walking on the land, large plashing drops. But the rain-storm we encountered was nothing to that which swept down the centre of the bay. The thunder roared, and was accompanied by vivid flashes of lightning. The violent squalls raised the sea and tossed the ice about. A splendid double rainbow shone forth, and the effect was grand. It is a mistake to suppose that thunderstorms with lightning in the arctic regions are always accompanied by hail; none fell that day. July 9 was a perfect day, temperature in the shade 60° Fahr. The floes around us were dripping at a great rate, and much of the pack had been driven out of the bay by the storm. We took advantage of this, heaved the anchor, and steamed out, working along the western side of the bay where the ice was more loose; by midday we had cleared the headlands and off-lying islets, never having less than 12 fathoms of water. Outside we got into loose, heavy-sailing ice, evidently fragments that had drifted from the Kara sea; but for the exception of occasional heavy pieces of floe, the strait was clear to the eastward as far as our vision extended, and I ought to add that the same conditions existed during the entire time we remained in the north end of Waigata. On no occasion were we able to see the land of Novaya Zemlya from Waigata.

During that day and most of the 10th we steamed leisurely down the west coast, in a perfectly calm sea, and through occasional banks of fog; the shade temperature was from 50° to 53°. We let down the dredge in 20 and 17 fathoms. We passed many dead dragon-flies floating on the water. By the evening the fog had entirely lifted, so we headed in for Liantschina bay, steering for the mouth of the Talata river. This bay is full of rocks and dangers. We were groping our way in, going dead slow; the leadsman called out 7, 6, then 2½ fathoms, and the next instant we slid up on a rock and stuck there. Fortunately, the sea was like glass, there was little or no wind, and the ice-pack on our port side was asleep. We got up steam in the launch, put our chain cables into the boats alongside, put out a kedge anchor astern, and by dint of hauling at her bow with the steam-launch, and going full speed astern, we got the ship off in a couple of hours without the slightest injury, and no coal had to be thrown overboard. As we had no special interest in discovering more hidden rocks, we departed from Liantschina bay and worked quietly down to Cape Greben, the south-west point of Waigata, which marks the entrance to Yugor straits. Not a speck of ice was to be seen; the strait was absolutely clear. We anchored in a bay to the eastward of Cape Greben, in 3½ fathoms. Early on the 11th our invaluable steam-launch put us ashore at Cape Greben. The shade

temperature when leaving the ship was 60° , on shore intensely hot. Yugor strait lay iceless, calm, and placid. It might have been a summer's day in the Mediterranean. When we landed on the tundra—for the south part of Waigats is far more level than its northern area—we were astonished with the profusion of the flowers: we walked through flower-gardens. Dotterels, little stints, purple sandpipers, with their freshly hatched out broods, ran around us; reeves were fewer in numbers; snow-buntings, shore-larks, and Lapland buntings hopped around; snowy owls sat on the peaty knolls and watched our proceedings with serious interest; the terns were alive with red-necked phalaropes, chasing one another. It was indeed a very delightful experience. One can hardly hope for elysium on this earth, and this



CAPE GREBEN, WAIGATS.

(From a photograph by H. J. Pearson, Esq.)

almost perfect day had one drawback in the myriads of mosquitoes that rose from the tundra. They settled in swarms on our necks and hands, making it necessary to crush the pests every few minutes. Towards evening a dense fog came rolling in from Barents sea; it enveloped us with a pall. The flowers closed their petals, and the birds disappeared, and the mosquitoes as well. Cold and damp, we hurried back to the launch, and made our way to the ship through the dense fog. We found a family party of Samoyeds on board; having seen the ship, they had crossed over from the mainland, and brought with them a large supply of *Salmo alpinus* and *Salmo omul*. The party consisted of an old man and his wife, their two sons, a daughter-in-law, and her two children, the eldest about two years old. These little Samoyeds in their fur-lined caps are pretty creatures; they of course were stuffed

with sugar and chocolate. I brought out a flaring red-checked handkerchief and tied it round the baby's head. The mother was charmed, and beckoned to one of the young men, who brought up the two largest fish in the boat, some four or five pounds each; these she put into my hands. They asked for vodka, and were refused it; but they left us apparently delighted with a tin of tea, which was given them in exchange for their fish.

On July 13 we crossed the strait, and anchored about a mile from Khabarova, in $5\frac{1}{2}$ fathoms. This little settlement of a few log houses, several Samoyed chooms, a church, and a large store-house, is better known by name than many important towns of Russia. It owes its fame to its unique position. Placed on the shores of Yugor strait, the highway to the Siberian coast-line, it is the last post of civilization on the confines of Europe, and consequently all trading vessels bound to the Yenisei, or exploring ships proceeding to the Kara sea, call in at Khabarova. The settlement is built on a raised beach of gravel; behind is the flat, dreary, monotonous, treeless tundra stretching away for hundreds of miles. The choice of Khabarova for a settlement must, I think, have been determined by the existence of a small lagoon behind the raised beach, into which falls the Nikolski river. The water from this stream keeps open a narrow passage through the bar of shingle, some 30 feet wide, and with some 5 or 6 feet of water at high tide. Through this narrow passage the Russians are able to push their shallow-draught lodjas and karbasses into the lagoon. Once inside they are safe from the ice, no matter how much may be passing through the strait. Most of the Russian traders who summer at Khabarova are natives of the Pechora district, where they pass the winter. In the early spring they leave Pustosesk with their reindeer, and sledge along the shores of the arctic sea to their destination; and when the snows of autumn again make the tundra fit for reindeer-sledging, they return to their homes, with the furs and produce of the chase which their Samoyed employés have collected during the preceding winter. We were cordially received by the chief trader, Ivan Alexandrovich Koshevin and his son, who is well known to several of the gentlemen present here this evening, and indeed by all the Russians at Khabarova. I have no doubt this was in a great measure due to the kindness of Colonel Jule Shokolasky, one of the secretaries of the Imperial Geographical Society of St. Petersburg, who had taken great interest in our expedition, and also informed the Khabarova traders, before they left Pustosesk in the spring, of our contemplated visit to the great Samoyed tundra. We were especially desirous of learning from the Russians what was the likelihood of being able to land from our vessel at the mouth of the Koratoika river, or at any point beyond that to the gulf of Khapidirsk. They one and all expressed doubts, but said, "We cannot be certain, for we know not of any such attempt having been made, not even by our light-draught lodjas. If you

want information about the route by land from here to Pustoseak, we can tell you every verst of the way, and the best places to cross the rivers, but we know nothing about the coast navigation. We believe the shore to be shallow for many miles out, and the ice usually remains late in the gulf of Khapidirak. Some of us have landed on Dolgoi island, but not further south in that direction." This information was truly disheartening, for the object of the expedition was to land on the shores of the great tundra and study the ornithology of that remote region. I will not occupy your time by recounting our walks over the tundra around Khabarova, for that locality has already been described by better-qualified persons than myself, notably Mr. Frederick Jackson.

The weather continuing remarkably fine, a run into the Kara sea was determined on. We left Khabarova early in the morning of July 18, and steamed through the Yugor strait. No ice visible in any direction, and we passed along the east coast of Waigats, in a blue and tranquil sea. So settled was the weather, that when in the afternoon we got abreast of Cape Matiusela, we did not hesitate to drop anchor about a mile from that iron-bound coast, in $5\frac{1}{2}$ fathoms, and to go on shore for a long run.

Marine boreal beds are very conspicuous on this part of Waigats, and for several miles both north and south of Cape Matiusela. They occur as thick beds of clays and sands, resting unconformably on the fundamental rocks of the island. At the Falushiba river to the northward, they attain the great thickness of 115 feet. I found layers of compressed wood in these beds, almost approaching lignite—no doubt sunken driftwood. Moreover, these marine boreal beds are crowded with erratics, many of immense size, often beautifully polished, and grooved and scratched. Near the coast-line streams and runnels flowing from the inland tundra have eaten out dells through the soft sandy marine beds, and the disconnected areas have worn away into rounded knobs, so that at a distance it appears that a line of low hills fringes this coast. At the time of our visit the land was green and covered with flowers, so that, with the bright blue sea and many birds, the scenery was cheerful enough. Almost at the north-eastern extremity of Cape Matiusela, a considerable mass of rock protrudes from the marine boreal clay, like a nunatak from the ice, and on it the Samoyeds have a holy place. It is a poor modern reproduction compared with those described and figured by the early voyagers to Waigats. A cairn of large stones built on the summit of the rocky eminence had a fir pole 8 feet long wedged in. The point of this pole was sharpened, and stuck on it was the cervical vertebra of an ice-bear, muscular fibre and flesh still adhering to this bone. Piled around were seven reindeer skulls and horns, and the skull of one ice-bear. Numerous offerings in the shape of broken tally-sticks, old powder-cans, soraps of iron, and useless odds and ends, were scattered around. It is evident that a remembrance

of their ancient heathen worship still lingers amongst the Samoyeds, probably more as an old-fashioned custom to bring good luck in the chase than anything else.

We left Cape Matusela at midnight of July 18, and returned through the Yugor strait to Khabarova, and steamed to the westward with the object of testing the feasibility of making a landing at the mouth of the Korotaika river. After clearing the Yugor strait we steered to the southward, running parallel and some 8 miles off the Russian coast, and heading for Chornoi Nos. The day was beautiful, the sea like glass, with hardly a breath of air. By the evening of July 19, we were in lat. $69^{\circ} 20'$, just on the last line of soundings given in the chart, but we only got 8 fathoms; as we proceeded the depth continued to shoal gradually but evenly. By midnight, some 20 miles further south, the depth had decreased to 4 fathoms; our ship was drawing 10 feet. We were still some 20 miles from the mouth of the Korotaika. We thought of trying to get there in our launch, but the risk was too great, for if a gale happened to spring up, there was no knowing where our ship might be driven to. The coal for the launch would be expended, and we left on an uninhabited shore, supposing it had been possible to make the land. We reluctantly came to the conclusion that our ship's draught was too great for this shallow coast, so we turned back on our course until we were abreast of the island of Dolgoi, and then bore down to it. In the morning of July 20, we came to anchor about a mile from its eastern shore, in 7 fathoms, hard bottom. Dolgoi Ostrov, or long island, is about 17 miles in length, and a little over 2 miles wide at its broadest. It is the largest of a group of five which lie off Cape Medenski Savarot, and stretch into the sea in a north-north-westerly direction. These islets were well known to the navigators of the sixteenth century, and are mentioned several times in the first and second voyages of Barents. Admiral Lutke gives some little information about them, but I cannot find that they have been visited by our countrymen during recent years, nor am I aware of any published information in regard to their geological structure or natural history.

The rocks of which Dolgoi is made are chiefly limestones and conglomerates, and, as far as my observation goes, are unfossiliferous. They dip very regularly at an angle of 45° to the eastward, and this holds good of the rock exposures on both sides of the island. The entire surface has been worn down to nearly a uniform level. The higher elevations are gentle swells, the most considerable not more than 50 feet in elevation. The whole is covered with a layer of the marine boreal clay, of the same character as that of Waigats and the tundra around Khabarova.

Innumerable shallow meres and ponds are scattered over it. So numerous are they, that walking a straight course is almost out of the question. One has to traverse devious peat ridges and wet marshes to

get round the ponds. This Dolgoi is a paradise for birds. Dunlins and red-necked phalaropes flew round and about in scores; the air was alive with divers of two species—red-necked and black-throated; grey plover and their young whirled over their breeding-grounds; reeves, turnstones, shore-larks, snow-buntings, Lapland buntings, red-throated pipits, king eiders, long-tailed ducks, glaucous gulls, and Richardson skuas were all common. The birds seemed to be unacquainted with the murderous propensities of man, for when I shot some ducks the skuas swooped down and battled with me for the prey. I found the botany of the island most interesting; a striking feature was the abundance of *Cassiopeia tetragona* and *Andromeda polifolia*, two of the *ericaceæ* which I



STIST LAKE, WAIGATS.

(From a photograph by H. J. Pearson, Esq.)

had not met with on the tundra around Khabarova, and which are absent from the flora of Waigats and Novaya Zemlya.

On the western shore we came across a Samoyed burial-place. Two weather-beaten old trunks, made of rough-hewn boards, lay under the shelter of a rock. The length of the one was 5 feet by 23 inches, and 13 inches in depth; the other was 5 feet 6 inches long, 24 inches in width, and 14 inches in depth. The boards were put together with wooden pegs and some iron nails. Heavy stones were laid on the lids. On removing these stones and raising the lids, we found that each trunk contained the skeleton of an adult. Judging from the wearing down of the teeth, they might have been elderly folk. But the wearing down of the teeth in savage or semi-civilized races who live by the chase, is not always a safe criterion for age. Both bodies had been buried in all their clothing, and the mouldering remains of their skin "pesks" shrouded the skeletons. By their right side lay several articles of

domestic use, such as broken wooden bowls, a snuff-box, and scraps of old iron. The long black hair still clung to the skulls. Around the graves were three sledges, more or less broken, and the bone gear for the harness lay scattered about; the reindeer-hide harness had disappeared. A rusty and damaged hatchet-head and a broken iron pot were lying close by. That the dead were left on an island had not been forgotten, for a pair of wooden paddles lay by the sledges. Some hundred yards north of these graves was a smaller box, containing the fragmentary remains of a child, likewise wrapped in reindeer-skin clothing. The second teeth were showing in the lower jaw; probably the age of the child was about five years. There is an incident connected with this grave which is almost a counterpart of what Captain Lyon tells us he met with in an Eskimo child's grave at Igloolik. At the Samoyed child's feet was a snow-bunting's nest containing five eggs, and lying on the mouldering "pek" a dead snow-bunting with outspread wings.

When I got down to the shore opposite to where the steam-launch was at anchor, with my loads of birds, plants, and rocks, the evening was well advanced, and the weather was still calm and beautiful, but the sea was rolling in with a long ominous swell, so often the presage of wind. In half an hour I was joined by my companions, and we at once started for the ship, which lay about 3 miles farther up the coast. By the time we got alongside, a north-easterly wind had sprung up, and blew so strong that I doubt if we could then have landed or got off the island. The waves were rushing in and breaking on the rocky foreshore, tossing great wreaths of spray 20 feet in the air. Kjeldsen, who was rather anxious about our running the stay on shore so fine, was all ready to leave, and in five minutes after we got alongside, the ship was steaming away from this dangerous lee shore. It was midnight before we had cleared the north point of Dolgoi. The following day we sighted Waigats, but we held on our course for South Goose cape of Novaya Zemlya. We had run out of the bad weather and into a sea like glass; no ice was visible in any direction. At evening time we sighted the southern land of Novaya Zemlya.

July 22 was another bright and beautiful day, and for the greater part of it we were coasting along the west side of Meshdusharsky island. To our surprise we saw through our glasses a frame house with flag-staff and glazed windows on shore, and we afterwards learnt that it had been put up by the Russians for the accommodation of their Samoyed employés, who winter there. In the evening we were abreast of the north-west end of Meshdusharsky. Here are some extensive loomerics, and my companions went on shore and brought back a good supply of looms, *Uria bruennichi*, for the use of the ship's company.

We dropped anchor in Belusha bay, South Goose Land, early in the morning of July 23, just abreast of the Samoyed settlement on the west side of that bay. We had anchored here in 1895, and made acquaintance

with the Samoyed settlers of the place, so that we looked forward to renewing our acquaintance with these nice people. We were soon ashore, and went to the settlement. There were the same amount of yelling dogs, and the same amount, if not more, of dirt and filth, that we had met with in our previous visit; but Mrs. Taitaina, the wife of the chief man, was as pleasant and smiling as ever. She recognized us at once, and said, "You are the people who came here two summers ago." Then Mr. Pearson handed to her copies of the photographs of herself and her children, and her choom and her dogs, which he had taken in 1895. She was delighted with them, and her broad honest face illumined with smiles. She told us all the men were inland fishing and



BOSMYSSLOFF'S WINTER QUARTERS, 1768-69.

(From a photograph by H. J. Pearson, Esq.)

hunting, but she hoped they would be back before we left. Then she took us over her establishment, and into a shed where blubber and geese and seal meat and many things were kept. There were long strings of geese-bills hanging up, which she treated somewhat disdainfully, saying, "These are playthings which the children collect;" but when she saw me counting the bills, which I did to see how many belonged to white-fronted geese and how many to bean geese, she begged me to take one of the strings of nebs with as nice manners as one might expect from a great lady in England doing the honours of her house. In this shed, filled with decomposed geese and ill-smelling blubber and reindeer meat, were several glass fishing-floats, which are used by the Loffoden fishermen, and which Mrs. Taitaina informed us are washed up at times on the coast—a very interesting fact, which illustrates that the influence of the Gulf Stream is a real factor on the west coast of Novaya Zemlya.

You may very reasonably ask how we were able to converse so easily with the Russians and Samoyeds; but Kjeldsen can speak Russian fairly well, whilst Petersen, our mate, who had likewise been engaged as interpreter, had resided several years in Siberia, and consequently had an excellent colloquial knowledge of Russian, and an equally good acquaintance with the English language.

Returning to the ship, Mr. Pearson and Kjeldsen shortly after started for the head of the bay in the steam-launch, with the object of exploring more fully a river which discharges into the north-east angle of Belusha bay, and which we partially examined in 1895, and thought must be a stream of considerable magnitude. We gave it then the name of Saxon river, after our yacht.

Mr. Pearson returned to the ship at midnight. He had taken the launch, with considerable difficulty owing to shallows, as far up Saxon river as our turning-point in 1895. Then he took to the land, and after walking along its banks for less than an hour, and passing a few rapids, the so-called river dwindled into the usual type of Novaya Zemlya streams, which at this time of the year might be waded over in many places, not above the ankle. The river in its lower reach was in reality a creek communicating with the sea. Certainly, in 1895 we had tasted the water at our extreme point, and then pronounced it fresh, but no doubt this must have been owing to a stratum of river-water floating on the sea-water. The party had been fortunate in finding many white-fronted and bean geese at the head of the bay and in the creek. These birds were not able to fly, having lately moulted their wing feathers. They brought back thirty-six fine birds, which proved most acceptable, as we had all been living for some time on preserved and salted meats.

We left Belusha bay early in the morning of July 24. The wind was from the south-east, but when we had cleared the bay we set our square sails and ran out between Meshdusharsky and the mainland, keeping the centre of the strait. It is necessary to give Podvezoff island, lying off South Goose cape, a wide berth, as a dangerous submerged reef runs out from it for two, maybe three, miles in a north and south direction. We were nearly wrecked on this reef in 1895. The wind continued favourable till the afternoon, then it shifted to the northward and blew hard, which brought up such a heavy tumultuous sea that we were glad to alter our course and run to the north-west all through that night. On the morning of July 25 we headed in-shore. By evening we had cleared North Goose cape, and were steering for shelter under Cape Britwin (the Razor cape). The next day turned out fine, with light northerly winds; the sea had gone down, and we steamed northwards at a distance of 3 or 4 miles from the shore. The coast-line from Cape Britwin to Nameless bay is not more than 300 to 400 feet high, sloping, and well covered with herbage; snow lay in patches in far

greater quantities than on Goose Land farther south. The marks of elevation along this coast are quite distinct; the land runs in parallel lines of grass-covered slopes. We could distinctly trace them to an elevation of not less than 200 feet. At mid-day Nameless bay opened up; we stopped and sounded 3 miles from shore, and got 20 fathoms. Thousands of Bruennich guillemots were passing and repassing to their rock-nurseries in this bay.

In the neighbourhood of the Matyushin shar, and on both sides of that strait, the mountain ranges of Novaya Zemlya rise in series of bold and lofty peaks, snow-clad and entwined by glaciers. Through this alpine region passes a narrow but deep channel connecting the waters of the Barents and Kara seas, and separating the island of Novaya



IBIS GLACIER, ZIWOLKA FIORD.

(From a photograph by H. J. Pearson, Esq.)

Zemlya from the north island, which has been very appropriately named Lutke Land for its southern part, and Barents Land for its northern half. We entered the Matyushin shar on the evening of July 26, and anchored in Cairn bay. The night was gloomy, and the mountains were shrouded in mist. At the head of this bay we were surprised to see a couple of good houses and signs of a permanent settlement.

Very soon after we dropped anchor, the headman of the settlement, a Samoyed, and half a dozen men and boys came off to interview us. We found the chief man extremely intelligent. He was dressed in a coarse cloth great-coat, and wore a Russian decoration; his followers were clad in the ordinary Samoyed dress.

Returning with them on shore, we were assailed as usual by a pack of hungry curs, but the ladies and children rushed out from the house armed with sticks, and belaboured the poor brutes into the semblance of good behaviour; one or two sulky ones were tied up in a trice, and in a few minutes amicable relations existed between us and the dogs.

The larger of the two houses at Cairn bay is an excellent one, built

of logs brought from Russia, and boarded over in front. A staircase leads up to the door, which opens into an entrance hall, beyond that a nice room with glazed windows, and a large well-built brick-and-tile stove. A sloping bed of planks occupied one side of the room, which was lined with pine boards. On the walls hung an Ikon, coloured prints, and photographs. Everything was scrupulously clean. In a few minutes the kind mistress placed on the table an immense dish of raw chopped fish and brown bread, which our Norwegian companions discussed with great zest. As Mr. Pearson and I did not join, we were each handed a fine *Salmo alpinus*, a most delicious red-fleshed char, to take away with us.

Our host informed us that this year the ice opened in the strait in May, an unparalleled event in the experience of the Samoyeds; that he and his family had wintered the last three years at Cairn bay; that he had been nine consecutive years in Novaya Zemlya. The winters were undoubtedly long and cold, but that the hunting of ice-bears during the periods of moonlight was most enjoyable. He and his men had killed thirty-nine ice-bears during the past winter. A week before our arrival the Russian trading steamer had called in and taken the skins away. I inquired what price he was given for them, but he could not say until the accounts came back from Russia. He had been credited with fifty-three roubles a skin for the ice-bears he had sold the year before. He told us, also, that year by year animals were getting scarcer, and that the Samoyeds had to keep pushing their hunting-stations farther north. He was just on the point of despatching a party of his men, who would winter at Admiralty peninsula for the purpose of hunting.

We left Cairn harbour the following day, and steamed through this wonderful Matyushin shar to the eastward. The weather was perfect, and we were lost in admiration of the superb scenery through which we passed. I have seen it stated that the towering precipices on either side of this strait crowd together and form a narrow gulf, with only a streak of sky visible between the frowning masses. This is an exaggeration, but all the same the reality is very grand. Nowhere is this strait 2 miles wide, and in some places it contracts to a quarter of a mile; seldom is there any stretch where the water is not lost to view by the closing in of the headlands, and one appears to be passing through a series of lakes surrounded by lofty mountains and overhanging precipices. Many glaciers pour down from the mountains almost to the water's edge, but I do not think that a single one actually discharges into the sea in the whole length of the strait. In the afternoon we steamed into Belusha bay, on the north side of the strait, towards the eastern or Kara sea entrance, and anchored in Seal bay, a most perfect and snug little cove, so small that we had to moor the ship, there being no room for her to swing, and with an entrance between two flat gravel spits just large enough to admit our ship; inside we got 3½ fathoms. As far as

protection from the sea or floating ice is concerned, we might have been in a dock.

We remained in Seal bay from July 27 till August 5. During this time the weather on the whole was very good, though on one occasion it blew with great fury for some hours over our anchorage. This fierce wind was, I believe, strictly local. Originating in the lofty snow and ice-covered interior, it came tearing down Belusha bay like a draught through a funnel. Apparently this tempest did not extend to any width, for whilst the entrance to the bay was lashed into foam, the straits both east and west were comparatively tranquil. The tide flows from the Kara, and the rise and fall in Seal bay at neap is about 2 feet. A great amount of Siberian driftwood is stranded on the shores of Belusha bay.

We made almost daily excursions in the steam-launch to various points on both sides of the Matyushin shar, and took long walks into the interior, but time will not permit me to give even a slight account of these pleasant expeditions. We botanized, studied the geology of those parts, collected the birds, and made many observations, the results of which will be published in the future. Perhaps the most interesting series of facts I have to record are the universal proofs of the secular elevation of these lands. Around Belusha bay stretch vast lines of old sea margins. The highest I could locate there with absolute certainty was 500 feet above present sea-level. In places where streams had cut through at that altitude, I found sections replete with the shells of *Mya truncata* and *Saxicava arctica*, then, as now, the commonest mollusk of these arctic seas. Equally significant of the marine origin of these beds is the presence of the tests of foraminifera of the same species as now abound in the surrounding seas. Mr. Joseph Wright, our greatest living authority on the subject, and who has taken in hand the investigation of the samples I brought back, writes me that a specimen of clay weighing 3 oz. troy, that I took from a shell bed at an elevation of 300 feet in the neighbourhood of Belusha bay, contained between two and three thousand specimens of foraminifera of thirty-five different species! Nor are signs of recent elevation confined to a limit of 500 feet, for I found on the summits of mountains 800 feet high, erratic boulders of granite and foreign rocks, the presence of which I cannot refer to the action of terrene, but to floating ice. These marine terraces likewise fringe the shore-line of to-day, a very notable one about 100 feet in height girdling the entire east side of Belusha bay. Subsequent stream-erosion has in some places effected great denudation, but outliers in the shape of rounded isolated hills, which remind one of eskers, are common enough. One of these has been dignified by von Heuglin in his chart* of Belusha bay as Albert peak.

* Special plan, Chart No. 318, published May, 1872 (Hydrographical Office, Washington, D.C.).

Can it be that this comparatively recent emergence from the sea, of the Russian tundra bordering the arctic ocean, of Waigats, of Novaya Zemlya, of Lutke and Barents Lands, has caused the withdrawal of the glacial period from Lapland, Scandinavia, and possibly Great Britain? This is certainly a startling theory for me to advance. But I found evidences which seem to me convincing, that the Russian tundra bordering the arctic sea, Waigats, Novaya Zemlya, and the North island were submerged in post-pliocene times 1000 feet below their level of to-day. This submergence must have permitted the ice of the eastern arctic seas to press down on Lapland and Scandinavia. What was the decrease at the shore-line in the mean annual temperature of Lapland and North Scandinavia under those conditions, is a matter for calculation, but it must have been very great.

Then came the secular upheaval of the lands I have mentioned, to a height of 1000 feet, and a nearly continuous breakwater of 600 to 700 miles long was raised, running nearly north and south into the polar sea. The results arising from this interposition of land we can see for ourselves. On the one side is the "ice-cellar" of the Kara, on the other the comparatively warm waters of Barents sea. A certain amount of the Kara sea ice now pushes through the straits of Yugor and the Kara strait, but this volume of ice has little effect in lowering the temperature of the waters of Barents sea. How different would be the result if the stupendous accumulation of ice, which is now fended off by Waigats and Novaya Zemlya, was pressed upon the shores of Lapland and North Norway! It would be an ice-drift equalling, if not exceeding in magnitude, the great polar drift which, sweeping down the east coast of Greenland, glaciates that island-continent, to nearly the same parallel as the Shetlands. This question, however, if it were dealt with in detail, would lead us rather beyond the science of geography, and I have discussed it fully in a paper which I hope to read in a few weeks' time before the Geological Society of London.

I think it ought to be mentioned that one of our excursions was to a bay on the south side of Matyushin shar, immediately west of Gubin bay, into which runs a stream marked in charts under the name of Farassowa. The sides of the mountains on both flanks of this valley are largely composed of iron ore for a thickness of some hundreds of feet. The bottom of the valley is filled with fragments that have been washed down or fallen. I also obtained traces of copper ore. This valley is well worthy the attention of a Russian mineralogist.

We did not realize, until near the close of our stay in Seal bay, that this was the same Seal bay where the celebrated Russian explorer Rosmysloff passed the winter of 1768-69, and but for a fortuitous discovery of some graves, we should have left the place oblivious of the fact. Those who are acquainted with the history of Russian scientific discovery in Novaya Zemlya, may remember that when Rosmysloff

determined to winter, his resources were so inadequate, and his means of housing his party so limited, that he divided it, one portion under the pilot Gubin settling at Cape Wood (Drowanoi Myss), on the south side of the channel, and he himself and the rest of his men putting up their hut in Seal bay. The ruins of Gubin's hut on Cape Wood are still quite recognizable, and the remains of bears' bones, crumbling and lichen-covered, are strewed around. Lately (1889) the Russians have erected at this spot a wooden cross with an inscription, to commemorate the wintering of Rosmysloff's party. Whilst examining the rocky promontory that forms the western side of Seal bay, we came upon a cairn of large stones inside of it was a coffin. Some of the stones had fallen down and bulged in the lid; we removed these, and inside lay



IBIS GLACIER, ZIWOLKA FIOD.

(From a photograph by H. J. Pearson, Esq.)

the perfect skeleton of a very tall man. The coffin had been made with much labour out of hewn boards, probably from driftwood. The care which had been taken in the burial showed that it must be that of a person of some importance, for close by was another skeleton simply covered over with a cairn; a further search showed five more graves of the same description. Then we felt sure that these graves must have some connection with the ruins of a Russian hut built on the gravel spit immediately below. And it dawned on us that Rosmysloff's party lost seven of their number, and that the second in command, the pilot Tschirakin, died after great suffering on November 17, 1768. We therefore feel tolerably sure that the skeleton of the tall man in the coffin is that of the pilot. But at some little distance from the grave a portion of an inscribed head-board was found lying among the rocks, which we brought away, and if decipherable will settle the point. Then we mended the lid, re-covered the coffin and re-built the cairn, placing great stones as supports across the side walls to protect the coffin, and reared up a cairn, so that the pilot's remains may rest undisturbed by the elements for centuries to come. The ruins of Rosmysloff's hut stand on the flat stretch of shingle at the entrance to Seal bay, about 2

feet above high-water mark, and some 50 yards from the shore. The roof, which had been made of logs simply laid across the side-walls and covered over with shingle, had fallen in; the timbers have nearly moulder'd away. The foundations of the hut are easily traced—only two rooms leading the one into the other, the larger 14 by 14 feet, the outer 12 by 12 feet; the brick stove was built in the larger room. After shovelling out the gravel and coming to the floor of the hut, we came across many articles that had been left by these Russians; some of them we brought away.

We left Seal bay on August 5, and entered the Kara sea. The weather was most beautiful, a light easterly wind, and a long rolling swell; temperature 45° to 50° . The height of the land rapidly decreases from Belusha bay to the eastern exit of Matyushin shar. Both sides of the straits are faced with lines of old sea margins. These stupendous terraces rise tier upon tier to a height of probably 600 feet; the slope of each terrace may be 100 feet; the angles and slopes are so sharply defined that they look as if they might be Cyclopean lines of fortifications. These terraces are splendidly exhibited on Myss Wychodnoy (Cape Exit), the northern extremity of the eastern entrance to the Matyushin shar. It was from this point, on April 8, 1835, that Ziwolka, the able lieutenant of the celebrated Pachtussoff, started on his sledge journey to explore the eastern coast of Lutke Land. Taking provisions with them on their sledges for a month, they pushed northward over the billowy shore-ice. They passed several bays, which the party had not time to explore, but which Ziwolka named in the following order: Cancrin bay, Unknown bay (Saliw Nesnaemy), and Bear bay (Saliw Medweshji). On April 24 the party reached Flotow peninsula, round Five Finger cape (Myss päť Palizow). Here the loosening of the ice to the north, and their provisions running short, compelled them to return. Ziwolka there erected a cross out of driftwood with the inscription, "This cross was erected by Ziwolka, captain of the company who penetrated thus far through the ice on a coast survey, April 24, 1835." They then beat a retreat. On the 30th he reached Cape Wood (Drowanoi Myss); on May 6 he again entered Pachtussoff's winter quarters in the Matyushin shar. That indefatigable explorer, having failed in the summer of the same year to circumnavigate Novaya Zembla from the westward, now determined to try if it would be possible to reach the north point of Barents land by the east coast. For this purpose he sailed eastward through the Matyushin shar in a small karbasse with a surgeon and five sailors. On August 15, 1835, he reached Cape Wood, worked his way through the drift-ice to the east entrance, and began the survey of the coast to the north. He was often obliged to take shelter behind stranded icebergs, jutting spits of land, and in inlets. In this way he succeeded in reaching the island which has since been named for him Pachtussoff island, in N. lat. $74^{\circ} 24'$, 35 versts beyond Ziwolka's

extreme point. It was impossible to push further, in consequence of the masses of coast ice. So, returning on August 28, he reached the mouth of the Matyushin shar, and from there his winter settlement.

How very different were our experiences this past summer to those of Pachtussoff! In the same month of the year as he met with almost impenetrable obstacles from the ice of the Kara sea, we were steaming along that shore in waters that would not have disgraced the Caribbean. During the evening of August 5 we were abreast of Cancrin bay. Near the shore the land is a low flat tundra rising in terraces to 500 or 600 feet; behind are the lofty interior snow-clad mountains. August 6 ushered in as beautiful a day as the preceding, and we



NEST OF LITTLE STINT, WAIGATS.

(From a photograph by H. J. Pearson, Esq.)

steamed northward within a mile or two of the shore. The first icebergs we had seen, either in Barents or the Kara sea, lay grounded on the foul ground and islets and reefs at the entrance of Bear bay. By evening we reached Pachtussoff island, and anchored on its western side in 5 fathoms of water, about a quarter of a mile from shore. We soon landed, and were scouring over the islands; for, though it is put on the chart as one, in reality there are several islands close together, with narrow and deep channels between, which might afford safe anchorage but for the risk of being sealed up by the ice of the Kara sea. The rocks of the island are hard grey limestone, but varying to yellow. The strata dip at a high, almost vertical angle from the east to

west. There are fossil organisms in much of the grey limestone—very imperfect, however, but sufficient, I think, to be determined. I put them down as of Silurian age. The surface geology shows the usual characteristics of gradual emergence, in the shape of terraces round the bays, and on the slopes, beds of marine clay with shells, and erratic boulders. Between thirty and forty species of flowering plants were gathered on these desolate islets. There is a conspicuous cairn placed on the most western of the islets, at an elevation of 130 feet. We searched it for a record, thinking that Pachtussoff might have left one there in 1835. Our search proved fruitless, but we carefully restored the cairn and placed inside of it a notice of our visit.

From the highest point of Pachtussoff islands, no ice, nor any appearance of ice, was visible, save a few small bergs. The next day we proceeded up the fiord that runs into the interior directly opposite Pachtussoff island. We steamed up this noble indentation for a distance of about 12 miles, until we got within a quarter of a mile of the glacier at its end; we sounded there, and found 40 fathoms. The sea-ice had entirely cleared out of the fiord, but over its blue surface were scattered huge blocks of glacier ice, and bergs of considerable size were stranded at many points. Mr. Pearson and Mr. Curtis, on landing, ascended the glacier from its flank, and travelled a long way over it, reaching an elevation of 650 feet. Down its centre is a medial moraine, in which occur most perfectly rounded water-worn stones. In company with one of the crew, Daniel Johannssen, who generally attended me in my walks, we ascended one of the hills that bordered the south side of the glacier. We found it a somewhat arduous climb, which took us over two hours to accomplish. We reached the summit at midnight; the temperature was 40° , and we threw ourselves, our clothes saturated with perspiration, on the ground. I had forgotten my aneroid. Daniel estimated the height at 2000 feet. I think 1400 feet would be within the mark. Phanerogamic vegetation entirely ceased at 400 feet from the top, and is replaced by a rich growth of lichens and mosses. *Cardamine bellidifolia* was the highest growing flowering plant. We were well repaid for our climb, as we looked upon a scene of rare beauty. The sun had disappeared behind the opposing hills that form the northern side of the fiord and hem in the glacier. They rise to about the same altitude as that on which we stood, and for miles look down upon the fiord, almost sheer for half their height, then as very steep screes to the water's edge. Amber-tinted fleecy clouds floated in the northward, against a background of pale cold blue sky, so characteristic of polar regions, whilst rosy tints tipped the mountain tops of the interior. Immediately below us lay the glacier some 3 miles across, but narrowing to about a mile where it discharges. Looking inland, the glacier seemed smooth, but at the contracted outlet it was greatly crevassed transversely.

To seaward the Pachtussoff islands lay like a network of reefs; and, looking beyond them, the Kara sea stretched north, east, and south without a sign of ice, save a few stranded bergs along the coast. About 10 miles inland five lofty nunataks rose from the centre of the glacier. They are black in colour, though streaked with patches of snow or ice. From each of these descended moraines, which, coalescing, formed the great medial one. Beyond stretched, as far as our range of vision, the *mer de glace*, broken here and there by lofty snow-clad mountains, but extending inland until its convex horizon merged into the pale blue sky. I think we may safely assume that the interior of Lutke land and Barents land is occupied by a *mer de glace*. As this grand fiord is unnamed on the charts, and we were the first to explore it, we desire to give to it the name of Ziwolka, in remembrance of Pachtussoff's able lieutenant; and to the glacier the "Ibis," in compliment to our brethren of the British Ornithological Union.

As we descended the hill, we saw the front of Ibis glacier calve. An immense mass of the ice-cliff fell forward from a line of crevasse into the water. We first saw a portion of the face of the glacier move, rock, and then fall forward, then clouds of vapour, then a dull roar as of thunder, and then the circling waves rolling outwards. Though several great masses of the calf remained apparently stranded at the edge of the glacier, yet fragments showing as large as big cottages floated away, and a fan of these ice-blocks soon spread for a mile or so around.

Our voyage had been so pleasant, and the weeks had passed so swiftly, that it was hard to realize that the limit had been reached for further progress, more especially as there would, in my opinion, have been no physical obstacle to exploring the unknown coast-line from Pachtussoff island to Barents winter-quarters. The coal left, however, was barely sufficient to take the *Laura* back to Tromsø, in accordance with the date fixed for the termination of the charter party.

On our way south we steamed into Bear bay, and photographs were taken of the glacier at its head. By midday of August 9 we were back in the Matyushin shar. The weather continued to be fine and warm; we literally basked on deck in the heat of the sun. Before quitting the strait, the ship was stopped for a few hours, and Mr. Pearson ascended a mountain on the north side to an altitude of 2000 feet, from whence a series of photographic views were obtained, which illustrate the character of that part of the interior of the south and north islands. We put into Cairn harbour to say good-bye to our pleasant Samoyed acquaintances. Then we steamed down the coast to Nameless bay to have a look at its immense rock-nurseries of the arctic loom (*Uria bruennichi*). These wonderful breeding-haunts, with their countless numbers, have been well described by Admiral Markham.* He tells us that none

* 'A Polar Reconnaissance,' p. 151.

of the "loomeries" that he has visited in Greenland and other parts of the arctic regions can be compared with those of Nameless bay. I quite agree with him. But it was early in the season when he visited the place, and the birds were sitting on their eggs. As we saw the cliffs later in the year, when the entire progeny had hatched out as well, and the myriads of the rising generation were huddled together along with their parents on the ledges, it is truly a wonderful sight which baffles description. We killed sufficient of the birds to supply our crew with ample fresh food for the return voyage to Norway, and on the evening of August 12 we left the shores of Novaya Zemlya, and set a course for Vardö. Though the primary object of the expedition had failed, namely, to land on and investigate the great Samoyed tundra, yet the alternative trip had turned out most interesting and delightful. We had a splendid run across Barents sea to Vardö, where we called for our letters, and then on to Tromsö, which we reached on August 20. There we took the mail steamer to Bergen, reaching Hull on the 30th.

A few words as to the scientific results of the voyage.

The ornithology of Waigats, Novaya Zemlya, and the North island is, I think now, practically worked out. The results of our observations, along with those of our predecessors, have been embodied in a paper by Mr. Pearson, which will shortly be published in the *Ibis*.

The botanical collections are satisfactory. They embrace at least three-quarters of the phanerogamic flora already recorded from the Novaya Zemlya group of islands, and I have added several interesting plants to those already observed there. But by far the most important discovery was my finding what has hitherto been considered the rarest and most inaccessible of flowering plants, growing in the greatest profusion both in Novaya Zemlya and Lutke Land. The localities where this beautiful little grass, *Pleuropogon Sabini*, has been obtained were recently enumerated by Mr. Fisher, the botanist to the Jackson-Harmsworth expedition, before this Society.* I may say that von Baer found it in Novaya Zemlya in 1837. Prof. Aagard, who took part in von Heuglin's expedition to the same island in 1871, brought back a single example; and in later years a few specimens have been found there by Russian explorers. Now I have to tell you that I found this plant growing abundantly at Belusha bay of South Goose land, at Nameless bay, and in every valley I visited on both sides of the Matyushin shar, Silver bay, and many other localities. In the neighbourhood of Belusha bay of Lutke Land, I found it in great quantities around meres and over wide areas of wet ground, to an elevation of 700 feet. I consider it to be the commonest grass of Novaya Zemlya and Lutke land.

The examination and description of the large series of rocks that I collected at each locality visited has most kindly been undertaken by

* *Geographical Journal*, vol. viii. p. 560.

Prof. Bonney, and his report will undoubtedly largely add to our knowledge of the rocks composing Dolgoi island, Waigats, and Novaya Zemlya. In stratigraphical geology a not unimportant fact brought to light is the knowledge that on the eastern shore of Lutke land, in N. lat. $74^{\circ} 24'$, there are rocks of Silurian age. Since writing this paper, I have obtained from Mr. E. T. Newton, F.R.S., who has been so good as to examine the fossils I brought back from Waigats and Novaya Zemlya, the following preliminary report: "The series of fossils from Cape Greben, Waigats, are without doubt Upper Silurian; but the specimens from Pachtussoff island are not so certain. I think that in all probability they also are Upper Silurian, but as there is a possibility, according to Lindström, of some of Nordenskjöld's fossils (*i.e.* from Cape Greben) being from passage beds between Upper Silurian and Devonian, there is just the same possibility with yours; the forms of *Favosites* and *Syringopora* not being distinctive."

The collections of insects, marine invertebrates, and soundings have been placed in the hands of specialists.*

A CRUISE ON THE EAST OF SPITSBERGEN.†

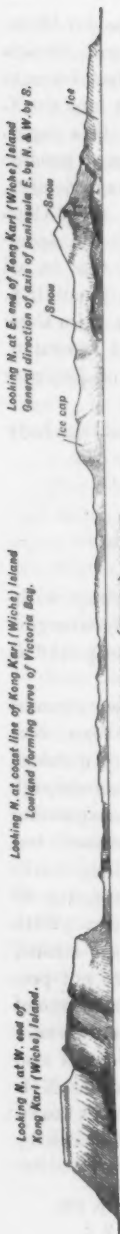
By ARNOLD PIKE.

TOWARDS the end of last July, after a quick passage from Norway, without seeing ice, we steamed up Stor fjord on the east coast of Spitsbergen. Stor fjord was ice-free except for a small quantity of broken-up stuff at the north end.

Wishing to reach the east coast of North-East Land, we steamed through Freeman's straits. At the east end some large floes were drifting about, lanes between them opening and shutting very quickly, so we returned and tried Helis sound. Violent currents rush through this sound at, I judge, a speed of ten knots per hour. After steaming through the sound we found much open water to the eastward, but there was enough light stuff to prevent us from reaching Kong Karl's Land. The ice was fast to Cape Mohn. None of it was heavy or badly packed; indeed, it seemed to be mostly ice of the year. With the intention of returning later, we steamed up Hinlopen straits. Northerly winds had been and were prevalent, but we were not prepared to find the big bays on the east side of the straits entirely free of ice; neither was there any ice in the straits. Old walrus-hunters said they had not seen the like before. Curiously enough there was also much open water along the north coast, and we reached Charles XII. island with but little difficulty. North of this point there was some heavy ice, apparently tight, but to the eastward it was lighter, and evidently

* For discussion, see p. 370.

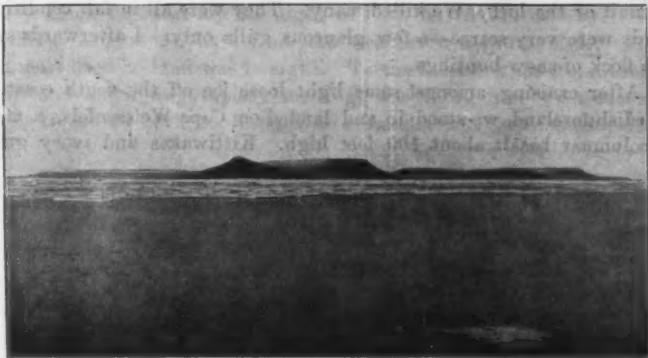
† Read at the Royal Geographical Society, December 13, 1897. Map, p. 464.



melting up, although it was not possible to reach Cape Leigh Smith. A few days later, in the middle of August, several walrus sloops rounded the cape and reached Great island. In the mean time we had returned down Hinlopen straits and stood towards Swedish foreland in an ice-free sea. Off the north coast of this group of islands there was a great deal of floe-ice. We worked some way northward through it, hoping to reach White island, but in the continued thick weather we could not find a way between the floes; nor could we find, in the fog, a high island which we reckoned to have seen in an east-north-easterly direction from the north end of Bremer sound. We then worked through loose ice about 35 miles east by north of the east point of Kong Karl's Land, still in the fog. From here we drifted back with the ice before a strong easterly gale, and with a westerly current, to a rather low island off the east point. This island, which is not marked on the charts, is about 8 miles in length, and lies immediately east of Abel island. It is apparently basaltic and quite barren. Without a reckoning, in the fog, we took this to be one of the islands reported to have been seen by Andreassen and Johannesen in 1884, but which we afterwards found do not exist.

Next day, August 20, the weather became clearer, and we steamed along the south coast of Kong Karl. From the east point the cliffs are from 50 to 100 feet. Behind them is a basaltic plain 3 or 4 miles in length, covered with small lakes and tarns. The land then rises in a rounded hill 800 to 1000 feet high, and sinks again to a low isthmus and plain, at the western extremity of which is the high land and a detached table-topped mountain at the west end of the island. The shape of the island is roughly a figure of eight, the eastern loop being much the smaller. We landed in the big bay on the west of Tömmernaes—as it was necessary to refer to this bay afterwards, we called it Victoria bay—and crossed the narrowest part of the isthmus, a little upwards of a mile, to the sea on the north coast of the island. There was no snow ashore, except on a small ice-cap on the slope of the above-mentioned hill, and on a small glacier on the sea-slope. The land rose sharply in what looked like well-marked raised sea-beaches, which did not, however, seem continuous. They were of round, sea-worn, basaltic pebbles. I did not count them, but we crossed probably a dozen before reaching the summit. Some of the beaches

were composed entirely of very small pebbles, and others of much larger pebbles, as if they had been exposed to the action of the sea for widely differing spaces of time. It would seem that heavy seas must have washed, and probably do wash, this coast. The hill to the eastward



KONG KARL LAND, FROM NORTH.

was of the same rock—I think, dolomite—of which the whole island seems composed. The highest point where we crossed was from 150 to 200 feet above sea-level, and there were pieces of driftwood all the

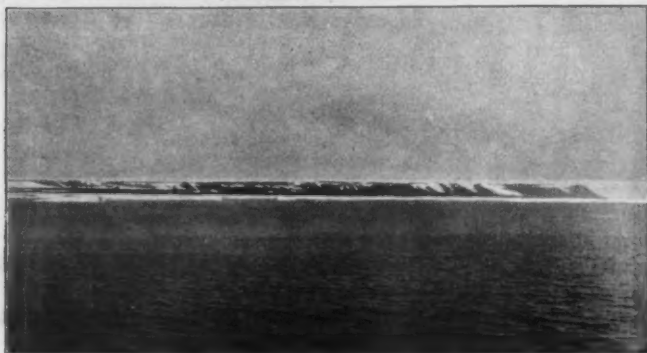


KONG KARL LAND, FROM NORTH.

way to the summit. Those nearer the sea were not so decayed as those higher up. I do not think that they had been pushed up by ice, but that the land is rising. We saw no soil or vegetation. Between the foot of the above hill and the sea there is a little moss, and on the

hill itself a few lichens and scattered reindeer moss, but that is all. We saw no reindeer sign on this island, but a great number of bears. There was so little ice at sea that the bears seemed to have taken up their quarters ashore. A small glacier or ice-foot along the coast was pitted with lairs, and others had dug holes in a snow-patch near the summit of the hill. We killed many. They were all in fair condition. Birds were very scarce—a few glaucous gulls only. I afterwards saw one flock of snow-buntings.

After cruising amongst some light loose ice off the south coast of Swedish foreland, we stood in and landed on Cape Weissenfels, a mass of columnar basalt about 100 feet high. Kittiwakes and ivory gulls



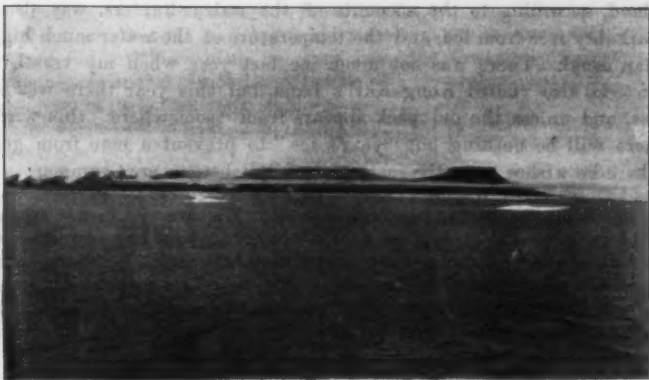
EAST COAST SWEDISH FORELAND, LOOKING NORTH-WEST UP BREWER SOUND FROM CAPE WEISSENFELS.

were nesting together on it, and a few Mandts guillemots. It is connected by a stretch of yellow sea-sand with a high flat-topped cliff, which, with a sea frontage of about 4 miles, terminates at Cape Hammerfest. The cliff is composed of what seemed to be well-defined horizontal strata of shale and sandstone, but they may have been simply intrusive sheets of a basaltic nature. They were capped with dolomite or hyperite. We did not land there. This high land stretches away, level-topped, to the north-west, forming the backbone of the island—Swedish foreland. A long sandy slope, on which are patches of moss or grass, runs from this backbone to form the western shore of Bremer sound at this end of the island. We saw a quantity of big drift timber on this slope. On the summit of the basalt ridge, say 150 feet, which juts out to form Cape Hammerfest, we found old whale bones, mostly very much decayed. We found also old reindeer horns, but saw no beasts.

Bremer sound is here about 12 or 14 miles wide, with a bad shoal, $1\frac{1}{2}$ fathom of water, in mid-channel.

Observations taken with sextant and artificial horizon, both on Cape Weisenfels and near Tømmernaes, agreed very nearly with our position on the Admiralty Chart.

On August 23 we worked about 40 miles in a north-easterly direction from north-east point of Kong Karl's Land, through scattered light ice in thick fog, and lay all night in D.R. N. 79° , E. $33^{\circ} 25'$. Next morning, August 24, at 3 a.m., the weather was quite clear. From the mast-head no land was in sight. To the eastward the ice, although light and apparently rapidly melting, was tight, and we steamed a straight course back to Kong Karl's Land. The two islands which



CAPE HAARFAGRE, SWEDISH FORELAND, FROM NORTH-EAST.

were supposed to lie to the east of Kong Karl's Land do not therefore exist. I feel convinced that the mistake arose through the shape of Kong Karl's Land itself which, when viewed from a short distance, appears as two, or from some points of view as three, islands.

We then steamed up through Bremer sound, and on August 25 found the ice still fast to Cape Mohn, and stretching eastwards. It was light floe-ice, and I have no doubt there were leads through it, but there was too much fog to see much, and we did not wait. After drifting in dense fog up Hinlopen straits again, we returned to Kong Karl's Land and cruised along the north coast, seeing nothing but broken up bay ice. On August 28 I climbed about 500 feet up the hill at the east end of Kong Karl. Light broken ice was scattered over the sea in north, east, and south, but there was mostly open water. When we left on August 30, the ice to the south had become jammed together by a slight breeze, and we could not work through it either to the west or east. We therefore went northwards, and cleared it on the 31st when about 12 miles south-west by west from Haarfagrehaugen, the north-

west point of Swedish foreland. We made the mouth of Freemans straits, and steamed down the east coast of Edge island in clear weather on September 1 without seeing ice except the usual flat-topped bergs, hundreds of which were aground there. Not being able to find any ice, we took a departure from South Cape on September 3.

It is hard to say what has become of the heavy old polar pack this year. Strong northerly winds prevailed during the spring and summer, and one would have expected to find heavy ice jammed tight to the north coast and north of Kong Karl's Land. During the whole voyage, however, we saw no old pack, although there seemed to be some heavy ice beyond Charles XII. island. The sea to the eastward of Hope island, according to the accounts of the walrus-hunters, was also remarkably free from ice, and the temperature of the water much higher than usual. There was not much ice last year when my vessel, the *Victoria*, also visited Kong Karl's Land, but this year there was still less, and unless the old pack appears from "somewhere" this winter, there will be nothing but "year's ice" to prevent a man from going where he wishes to on the east coast of Spitsbergen next summer.

In opening the meeting, the PRESIDENT said: We have with us this evening a number of arctic navigators, from some of whom we hope to hear very interesting accounts of their experiences and the work they have done. Especially we have here an old friend, Colonel Feilden, who is going to read a paper on his summer cruise in Novaya Zemlya, and tell us of the remarkable condition of the ice in that part of the arctic regions during the last season. I will now call upon my old messmate, Colonel Feilden, to read his paper.

After the reading of the papers, the PRESIDENT said: There are several distinguished arctic officers of an earlier period here, and several eminent naturalists. Quite possibly some of them may wish to make remarks on the subjects of the papers we have just heard. I also see here Lieut. Peary. I should particularly like to ask him whether he would kindly tell us something of the condition of the ice this year in Melville bay and the northern parts of Baffin's bay, and whether his testimony agrees with that of Colonel Feilden and Mr. Pike with reference to the remarkable character of the season.

Lieut. PEARY: Mr. President, I had hoped to come here to-night as a listener rather than to speak. I did not have the pleasure of hearing Colonel Feilden's paper this evening, but will add my little quota to the information in regard to the character of the ice this season in another portion of the arctic regions. I found the same conditions as those already noted by the distinguished gentlemen who have preceded me this evening. We sailed close to the Labrador coast, and we saw absolutely none of the usually southerly trending stream of ice, which has been there in every previous summer that I have been north, all along the coast. I found no ice on crossing Hudson strait. We crossed the mouth of Cumberland sound in a fog, and off Cape Walsingham we barely touched a limited stream, but by making a *détour* of 5 miles we rounded it, and then bore away to the Greenland coast, and followed that up to Disco, across Wagiat strait, touched at Uppernavik, and it was then clear up to the peninsula, at the northern end of which is the Devil's Thumb. In trying to get across Melville bay we were obliged to clear some icebergs, but no crushed ice; after that we encountered no field-ice until we struck the northern shore of Melville bay, about 35 miles east of Cape York. We forced

our way through the glacier *débris*, out by the headland, and back to the meteorite island directly inside the Bushland island, and there was no ice, and by the little island off Cape Labric there was no ice. There we encountered a severe snowstorm; it was snowing so thickly that we could not see the length of our ship—150 feet. But there was no sign of pack-ice anywhere about Cape Sabine, and had it been clear I should have gone on north, and I expect I could have reached Cape Bergotz, and probably have tried Kane sound, but it was so thick. I had with me such a scant supply of coal that I turned back, but had circumstances permitted it I feel sure I could have gone forward. Returning, we crossed to Cape Walsingham, where two years ago I was hung up for three days in the middle of September, and kept on through the strait of Belle isle down to Sydney, Cape Breton, without having seen one piece of pack-ice. Whether this means there was no ice above there, I am not prepared to say. My own opinion is that, rather than take that view of affairs, I should be inclined to think that the heavy arctic ice had jammed somewhere, and that the ice below it had passed away to the southward. As a matter of fact, very heavy arctic ice passed down the Newfoundland coast early this spring, and created a great deal of trouble with the whalers, as several of them were injured in the earliest arctic ice any of them had seen. I don't believe there was any middle pack to speak of in Baffin's bay. The summer of 1894 was just the reverse of this; for years I doubt whether there was so much or so heavy ice as in 1894. In 1895 the middle pack was heavy, but there was little or no ice south of that; but 1897 was an abnormal season. I trust these remarks may be of interest in connection with the remarks from other speakers.

The PRESIDENT: We have had a particularly interesting evening, especially when we were on the subject of the remarkably open season this summer. We have heard how Mr. Pearson and Colonel Feilden have with perfect ease passed through the Matyushin shar, and might have proceeded as far as the northern shore of Novaya Zemlya itself. We have had a most interesting account from Mr. Pike of the way in which he has steamed through and round Wiche's islands, and we have heard from Lieut. Peary of the remarkable conditions in Baffin's bay. I am afraid that I agree with Lieut. Peary that the cause of this open season is a jam of ice in some narrow parts of the arctic sea to the northward. I presume, owing to certain conditions of winds and currents, the ice has been stopped to the northward, and I should hesitate to think the same conditions would prevail in the following year, although that may be the case. We have to thank these gentlemen for the interesting accounts they have given of the condition of the ice, and we have especially to thank Colonel Feilden for his most interesting account of the Waigats island, and of the flora of Novaya Zemlya, illustrated by the slides he showed us of the flowering plants and the birds nesting among them. We have to thank Mr. Pike for his paper, and we have particularly to thank the two gentlemen who served in the Jackson-Harmsworth expedition for their investigations of the flora and geology of Franz Josef Land.* I may here remark that Sir Leopold M'Clintock said to me the other day that the gentlemen who composed the Jackson-Harmsworth expedition are the first who have voluntarily remained for three winters in the arctic regions. The Rosses remained there for four winters, McClure and Collinson for three winters, but that was compulsory. Out of zeal for science these gentlemen remained voluntarily on Franz Josef Land for three winters. You will all, I am sure, pass a vote of thanks by acclamation to the gentlemen who have addressed us this evening, to Colonel Feilden, Mr. Pike, Dr. Koettlitz, Mr. Fisher, and to Lieut. Peary.

* For reports of the statements by Dr. Koettlitz and Mr. Fisher, see *Geographical Journal*, vol. xi. pp. 132-135.

THROUGH SOMALILAND AND AROUND AND SOUTH OF LAKE RUDOLF.*

By H. S. H. CAVENDISH.

RETURNING from a two years' shooting and sight-seeing trip in South Africa, on the mail steamer from the Cape, I happened to see a number of newspapers and magazines in which there was a great deal of information about Somaliland and the various expeditions to Lake Rudolf and its neighbourhood. It occurred to me that somebody ought, as soon as possible, to explore the west coast of Lake Rudolf, and that, as no Englishman had yet attempted exploration in that part of Africa, it was high time for British travellers to bestir themselves in the matter. From the accounts I read, it seemed that excellent big-game shooting was to be had, and the idea grew upon me, so that by the time I arrived at Southampton I had made up my mind to start for Lake Rudolf as soon as I could get an expedition ready. As I arrived home in June, I felt that the sooner I started the more likely I should be to hit off the rainy season in an unexplored district. Thanks to Lord George Hamilton's kind advice and help, I soon had everything ready, and sailed for Aden at the end of August, 1896.

When I got to Aden I found I had only thirty rifles, and was told by Colonel Ferris that it was absolutely ridiculous to go with so few. The deficiency was kindly supplied by General Cunningham, who gave me all the rifles he could spare—about another thirty. At Aden I found a registered headman who had been with Count Teleki, and he recruited the number of men I wanted, viz. 84. Half of my troubles during the journey were due to the rascality of this headman, through whose dishonesty I had to pay more than double the usual wages.

I bought all the trade goods I required at Aden, being badly swindled over the transaction, and eventually got my men and loads across to Berbera. Just before leaving Aden I had the good fortune to meet Lieut. H. Andrew, who was then on leave; after a short conversation he agreed to accompany me, and, though without an outfit, he started at once, hoping to pick up what he wanted on the Somali coast—as he eventually did. I wish, before proceeding further, to express my thanks to Lieut. Andrew for kindly allowing me to use, in preparing this paper, his copious notes on a part of the road which he took and I did not. Captain Merryweather, a resident at Berbera, gave me great assistance in collecting transport animals, though for several reasons I had to pay pretty heavily for camels, and even then could not get good ones.

* Read at the Royal Geographical Society, January 31, 1898. Map, p. 464.

We relieved the monotony of bargaining for our transport animals by having daily shooting-matches. At one of these the breech-block blew out of a Lee-Metford, and the rifle burst, slightly wounding Captain Merryweather. The accident might have been a serious one.

Andrew and I left Berbera on September 5 with a party of forty men, leaving the main caravan to follow. Three weeks afterwards the whole caravan assembled on the Silo plain, about 150 miles from the coast, and this point may be said to have been virtually the starting-point of the expedition. From here to the Webbe Shebeli we travelled southwards for a month, by a route which more or less closely coincided with that of Dr. Donaldson Smith, and need not, therefore, be described again. There are, however, a few points that may be of interest. We have very pleasant memories of encountering Prof. Elliot and his caravan. In addition to giving us valuable information, Prof. Elliot very kindly supplied us with a large quantity of trading goods, baggage animals, and live stock. During this part of the journey, which on the whole was very monotonous, we had one or two of the little experiences which African travellers well know. On one occasion we camped on the bank of what was apparently once the bed of a mountain torrent. Instead of crossing this depression before camping, we camped on arriving at its nearest bank, and what was our astonishment the following morning to find that it was a roaring torrent many feet deep, which prevented any of us from crossing for two days!

On crossing the Webbe Shebeli we found a Berbera trading caravan in great tribulation, having been raided the day before by a neighbouring tribe called the Aulehans, who had killed and wounded some of the party, and carried off their trading goods and baggage animals. We immediately followed the marauders, who, finding themselves opposed by so large a force headed by Europeans, immediately came to terms. We made them pay blood-money and return the stolen goods and animals.

Continuing for another fortnight, we came to the town of Lobari. Here we found that we were in the rear of an Abyssinian war-party, which had left only the day before, after looting the surrounding villages and driving off all the unfortunate natives' live stock. The natives begged us to join them with a view to recovering some of their stolen property, but this, of course, we were not in a position to do.

For the next four days we marched through desolate country, which had been devastated immediately before by the Abyssinian hordes. The men were very nervous, and the constant alarms during the night prevented any of us from getting any rest. We therefore decided to change our route, as there are pleasanter occupations than marching in the rear of an Abyssinian war-party, with the chances of unintentionally

overtaking it—a contingency that might happen at any moment, as its progress was, to say the least of it, not rapid.

We decided to go southward and make a bee line for Lugh. On approaching Lugh after three days' march, we found the ground in every direction strewn with discharged Remington cartridge-cases, and the marks of hundreds of horses' hoofs. A little further on we came in sight of a fort, the walls of which were lined by troops. Waving handkerchiefs, we approached, not knowing, as a matter of fact, whether we were nearing Abyssinians or friends. The Italian flag was hoisted, and, on approaching the fort, an Italian officer, Captain Fernandez, met us, and jovially informed us that he had very nearly saluted us with a volley, having mistaken us for Abyssinians, with whom he had had a very sharp engagement the preceding day. This grand old veteran, we found, had held the fort, though constantly attacked by the Abyssinians, for months after the Italian forces had met with such terrible reverses in Abyssinia. There we spent a very pleasant week, entertained by the commandant and his subordinates. We went out shooting hippo and small game, but the commandant always insisted on our crossing the river into British territory, as he considered it absolutely unsafe for a small party outside the fort on his own side of the river. We were very sorry to say good-bye to this gallant officer, who, though his provisions and ammunition had run short (for he had received no supplies for months), would not leave his post.

Another two days' march brought us to the Webbe Dau river. Here we were delayed by our first real bout of fever, half the caravan being incapacitated at one time. We carried our sick on the camels, and immediately left the swampy neighbourhood of the Dau.

On December 9, four days from the Dau, we first saw fresh elephant spoor. That evening we sat up expecting to see game coming to drink, and were very nearly trodden on by an elephant. He had arrived noiselessly from the direction in which we were not looking, and was within two yards of us before we were aware of his proximity, but as he moved off we recovered ourselves and shot him.

Here we had again great trouble in getting into communication with the natives, as they mistook us for an Abyssinian force, and they have been so badly treated by the Abyssinians that the mere mention of such a force in the country is enough to make them desert their villages and disappear. For the next ten days, marching west, we had some good elephant-shooting, bagging ten fine tuskers averaging 60 lbs. a tusk. I may say that during the whole expedition we made a rule never to fire at an elephant whose tusks we calculated were under 80 lbs. a pair.

On discovering that we were Europeans, and not an Abyssinian force, the natives became reassured, and returned to their homes. We were now for the first time among the Boran Gallas, and in that particular

section of the tribe which gave Donaldson Smith so much trouble. They treated us in the most friendly manner, pressing every kind of present that they considered valuable upon us, and we had the greatest difficulty in making them accept a return present. We found these people undoubtedly the most friendly natives whom we met during the whole expedition; they besought us to stay with them, and when we refused to do so, they begged us to lay a petition before the great chief of the English, begging him to extend the protection to them which they said he had afforded to Somaliland. One sentence from my diary I may quote. It is as follows: "One of the chiefs said, 'We know your



AWLIEN TRIBE.

chiefs rule in Somaliland; the Somalis are happy, and we want to be under your chief.'” They brought us numbers of people who had been horribly mutilated by the Abyssinians, and again begged us to stay with and protect them. Abeserlato, the Boran king, though we never passed nearer to him than 100 miles, hearing that Englishmen were in his country, sent his son to us with a present of thirty oxen and the best pony we saw in Africa. The son refused to take the present we wished to send to the king, so after his departure, when leaving the country, we sent him one ourselves by special messenger. The Borans were the most industrious and thriving and the richest race we encountered; in fact, looking back on our sojourn in the Boran Galla country, I would say it was the pleasantest time we spent among natives

between Berbera and Mombasa. In spite of the fact that these people are nominally under British protection, and carry on a trade in rubber, fibre, rope, honey, gum, and ivory with the Somali coast, the Abyssinians levy tribute to the extent of half of every caravan that leaves the country.

A few notes regarding the Boran people may not be amiss here.

The Boran resemble the Somali in build and general appearance, but are, perhaps, not quite so good-looking on the average. They are nomads, and count their wealth in camels, cattle, etc. The men look upon their women as slaves, but at the same time, unlike the Somali, they do some work. The Boran man wears a big loose kind of knickerbockers, made of very coarse strong native cloth, which the Konso people manufacture near Abaya; also a long piece of the same material round his shoulders, and several ornaments, such as rings, bracelets, beads, etc. In fact, they are covered with every description of native finery, made either of ivory, copper, steel, brass, iron, rhino-horn, string, or hair. They seldom carry shield or spear, but only a long stick with a big knob. Their wives are dressed in dirty greasy skins, and do the greater part of the work. They have no hostile tribes among them such as the Somalis, and never raid amongst themselves, so that they are rich in oxen, sheep, etc. They do not know much about game except the elephant and giraffe, which they hunt on horseback with spears. They gather honey, make rope out of bigloes, and a native beer (tembo), and trade in ivory. They have no religion, and, although they call their god by the name of Wak, they never seem to pay any attention to him. They eat meat dried in the sun, and drink the warm blood of any beast they kill. They also mix blood with their milk, and drink the latter thick and sour. A Boran chief does not eat camel's flesh, but the common people do. They carry a small quantity of ostrich feathers, one of which they put in their hair directly they kill a man. Each ivory bracelet worn on the right arm signifies that a man has been killed by the wearer, while for every bracelet of brass or other metal, one beast of some description or other has been killed. Ponies are very numerous amongst them, but very seldom worth having, and the only good one we had was that sent to me as a present by Abeferlato, the king of the Borans.

On January 6, 1897, we left Egder, and, diverging from Dr. Smith's route, struck a new line almost due west for Lake Stefanie. After three days' marching, we arrived at Dedesotdate, where salt is obtained from a lake in the bottom of a crater. It was near this that the Borans made their final stand against Dr. Smith, thinking that he wanted to rob them of their salt. Here, assisted by the natives, we stayed three days taking photographs, which I will show you presently. We were able to leave our caravan in camp and wander about the country, with a few natives as guides, without other escort.

Another month's marching brought us to the limit of the Boran

country, which we were sincerely sorry to leave, for while there we had been able to go about singly without fear. It was the only country throughout the part of Africa traversed by us in which we could go alone miles from the camp, knowing that any of the natives whom we met would help us in every way—a country in which we could go to any village, ask for a drink of milk and get it, the donors refusing payment. It is easy to imagine how sorry, as sportsmen, we were to leave a country where we could shoot at will without being hampered by an escort.

The old chief made the most extraordinary request we ever had from a native, and that was to give him a real English dinner—and you can imagine how he enjoyed it.

After two days' march through very mountainous and rocky country, we reached the north end of Lake Stefanie, and camped on the right bank of the Galana, which there joins the lake. Here were seven Wandorobo villages, and the people were friendly, and gave us presents. We heard that the Italians also had camped here about three months before. The water of the lake we always found drinkable, although saltier near the south end.

The Wandorobo form here a very small group of people, dwelling in seven small villages under one chief at the north end of Lake Stefanie. They cultivate "juari," viz. maize of the best quality, and live on oxen, sheep, etc., and elephant's flesh. They drink milk, coffee, and blood. They barter juari for cloth with the Konso people, and for coffee with the Harbora people. Their religion is confined to a belief in "Wak." They marry as many wives as they choose, paying for them in cattle. No camels or ponies are to be seen among them, but they have a great number of small donkeys. They are descended from the Korai tribe of Borans, one of those subject to Aboferlato, and resemble the Boran in every particular except that their features are not quite so good, the nostrils in particular being more dilated. They wear a brass band round their heads, with a flattened leaf-shaped piece, about 2½ inches long, hanging from the centre in front. This is rather an extraordinary-looking ornament. They cultivate crops and gather honey, but do not hunt or fish. As weapons they carry a long spear and a shield made of elephant's hide.

Three days' march from the Galana brought us to the southern extremity of the lake, where we were lucky enough to find perhaps the most useful thing that has yet been found in tropical Africa—that is to say, coal, and coal in large quantities. Though at the time a couple of hundred yards from the present level of the lake, the coal had evidently been laid bare by the action of the water. The outcrop at this point was several hundred yards square. As we found elephants to be numerous, we decided to make two camps a few hours apart, and to stay there some time for the sake of sport.

On February 19 Andrew and I started together, and, coming soon upon a herd of elephants, Andrew decided to follow them and to form his camp close by. I then proceeded to the place where Count Teleki's camp had been when he touched the south end of Lake Stefanie, which, as he mentions in his book, at that time abounded in elephants. After about three hours' marching, I spied an old bull elephant with good tusks standing under a tree taking a doze in the heat of the day, and proceeded to stalk him. Getting within about 15 yards, I fired my right barrel for his heart, at which he walked forward a few paces and then stood still, when I gave him the left. He then turned right round, offering me the right shoulder, and, after two more bullets, dropped dead.

We went on to Teleki's old camp, which was marked by two large trees—practically the only trees within miles—and found that a large grass fire had burned up the whole country for miles round, and that it had been evacuated by the elephants on account of the absence of grass. As we reached the trees, a fine leopard bounded out into the open, but at the same moment we espied a large elephant out in the plain coming towards the trees, so we did not follow it. We crouched down beside a half-burnt bush, and as the elephant passed about 30 yards away, I gave him my right behind the shoulder, when he turned round and made off, receiving the left barrel through his back towards the chest. He seemed very sick, and walked slowly along the open by the lake towards some thin bush about 3 miles off. My gun-bearers then advised me to turn the elephant with the two horses I had with me, and go up to him in the open; but, thinking that it was too foolhardy, and not liking the look of this elephant, I decided to allow him to get among the bushes before attacking him again. When he had entered the bushes, I started to follow him, when yet another elephant appeared about 50 yards in front of me, and walked under a thick bush, in the shade of which he stood still. We crept up as close as we could, and got within a few yards of him, as the bush was so dense that we could not see through it at a greater distance. After a time he moved his head forward a little, and I could just catch sight of his ear; so, aiming quickly just below the orifice, I fired, and he rolled over at once, and we finished him off while he was rolling on the ground. The cartridges I had been firing this day were very heavily loaded, and the recoil of the gun quite dazed me for a few minutes, so I sat down under the bush and took a smoke, while I sent the boys to find out where the other wounded elephant was. They soon returned to say that he was about 200 yards off, so we started off to have a look at him. We saw that he was very angry, swaying his trunk above his head, and throwing up sand every now and then. I saw that he was certain to charge if I did not kill him with the first shot, and thought that we had better leave him alone; but

my gun-bearer advanced with my 10-bore gun to a little bush in the middle of the plain, at the other edge of which the elephant was standing, so, not wishing to be looked upon as a coward by any of my boys, I followed up to the bush, and took as good a shot as I could get below his ear at a distance of about 40 yards. The bullet seemed to have no effect, for the elephant just turned round facing us, and walked straight for the bush by which we were concealed. He then stopped a second, with his trunk scenting the wind along the ground, and we could see that he knew exactly where we were. Unfortunately, my left barrel had only an empty cartridge-case in it, which had



WOMEN OF THE AWLIEN TRIBE.

jammed, and which I was unable to remove. My gun-bearer then said we had better make a run for it, and at that moment the elephant charged. The only way back to the bushes was over a plain about 100 yards wide, so, giving my gun to my bearer, we started off in different directions; but the elephant had caught sight of us, and made for me as straight as a dart. I was unable to run very fast on account of the terribly rough ground, which had been broken up by the elephants, the holes being concealed by the grass. I tried to dodge him, but he was too quick for me, and as I neared the thin mimosa bush, I saw him just over me with his trunk in the air, so I threw myself to the left on my face and kept still, thinking that the elephant might go on; he, however, stopped immediately, and, spinning round,

knelt down behind me with his head right over me, and took a drive at me with his tusks, which I luckily avoided by rolling in closer under his chest. He then pushed me under him with his trunk, and tried to pound me with his knees, but, as luck would have it, I was just out of his reach: I kept dodging his legs as they came down. This continued, my boys said, for half an hour; but he was very much occupied watching my gun-bearers, who were shooting and shouting from some distance off. At one moment he lay on me, and I expected every moment to hear the bones crack; but suddenly his weight was lifted off me, and I pretended I was dead, and, not wishing to see the *coup de grâce* coming, closed my eyes and remained quite still. The boys told me afterwards that he got up and backed off my body, and knocked his leg against a log of wood lying close behind. Mistaking the log for me, he vented his rage on it: he must have been badly wounded. After a time I heard the boys coming closer, and, waiting till they were fairly near, in case the elephant might not have gone far, I looked carefully round and saw him standing some 170 yards off. I got on my legs as fast as my bruises would let me, and staggered toward my pony. The boys, on seeing me get up, were dumfounded, and my groom, who was a great hulking fellow, wanted to carry me, thinking I must have some bones broken; but, although my left leg was seriously bruised, and my scalp damaged, I was in other respects unhurt. On my return to camp I went to bed, and sent out twenty boys to finish off the wounded elephant. This they succeeded in doing after putting about thirty bullets into him; he charged in every direction, and died hard. For the next ten days I remained in bed, too stiff to move, but was carried out to photograph the elephant and superintend the skinning and decapitation. The head I have had mounted since my return, as a memento of this lucky escape.

In the mean time, a party of forty boys had been sent to the west side of Lake Stefanie, to visit the Harbora people, with whom Dr. Donaldson Smith had had to fight. There are four tribes living on that side of the lake, viz. the Wandorobo, the Harbora, the Hamerkoke, and the Galubba. Doubtless there are several more on the other side of the range of hills between Lakes Stefanie and Rudolf, in which the Galubba live. These last are cut off from the west shore of Lake Stefanie, and it is a very difficult road to get to them. The other three tribes, consisting of about 1000 individuals each on the average, live only 10 miles apart, but bear no relation to each other, and each speaks a different language. They are sometimes at enmity with one another, and sometimes on good terms. The Wandorobo and Harbora we found very friendly indeed, and very anxious to trade. The chief articles of barter were beads and cloth with the Harbora, and beads only with the Hamerkoke, for these wear absolutely no clothes, and would not put a bit of cloth on, however much you gave them.

Providence has given them the cotton tree growing wild all round them, but, strange to say, neither they nor the Wandorobo or Harbora ever make use of it, and the two last still wear clothes which they get from the Konso people. The Harbora have three large villages on the plain halfway down the west side of the lake. Here they cultivate coffee, as well as a little juari, and also collect honey. They wear clothes and trade freely, but never move from the lake. Like the Wandorobo, they believe in Wak. In dress and ornaments they resemble the Boran, except that they wear in addition a large ivory bracelet in the shape of a crown, but in feature and colour they take after the Sudanese. Their weapons are spears, elephant-hide shields, and poisoned arrows. They hunt and kill elephants with bows and poisoned arrows, but have little ivory. They are great friends with the Borans, and possess an abundance of sheep, oxen, and small donkeys.

The Hamerkoke are nomads, having no villages, but living in open zeribas among the hills at the south-west end of Lake Stefanie. They cultivate coffee and juari in the plain below, and supplement their means of subsistence by collecting honey. They resemble Somali in their good looks and their colour, but speak a language of their own. Few ornaments are seen among them, and the men wear absolutely no clothes, the women a small piece of skin with a small bundle and heavy tassel of string. The Hamerkoke were formerly under the sway of the Harbora, but are now free and as powerful as the latter. They hunt and kill elephants; their wealth consists in sheep, oxen, and small donkeys. These people, rushing down on us from the hills, deliberately attacked us when we approached their country, but were driven off with the loss of two men, and we fortunately succeeded in making very good friends with them afterwards, through the aid of the Harbora people. This tribe and the Turkana were the only people with whom we ever had any difficulty.

We heard that the Harbora were industrious people and did a great deal of trade with the natives, and as we were short of coffee we were glad to be able to do some trade with them. Although Donaldson Smith had fought with them, they showed themselves exceedingly friendly to us, and even went so far as to help us to make friends with the Hamerkoke. On the west side of Lake Stefanie there was scarcely any game. The Harbora have a curious dislike for camels, not even allowing the transport camels of a trading caravan anywhere near their villages.

On the return of our reconnoitring party on March 7, the whole camp was again re-united, and started south-west for Lake Rudolf the following day.

From here to Rudolf—a distance which it took us five days to traverse—the wells were a very interesting feature, having all been made by the Kore people, who are an offshoot of the Masai. This

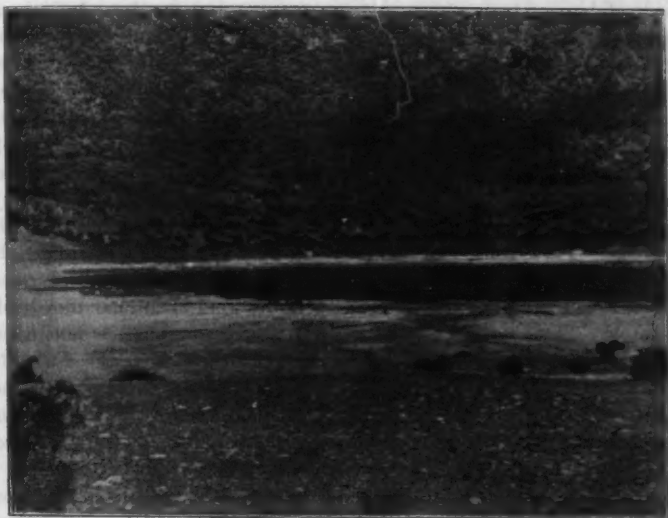
tribe was at one time very strong, but at present numbered a few hundreds only, and lived on the borders of the Masai country—in fact, intermingled with the Masai.

In our satisfaction at the sight of Lake Rudolf, we immediately determined to take a few days' rest. This done, we started northwards, and, after a day and a half's hard marching, reached the mouth of the river Omo, where the Reshiat people live, on March 22.

The Reshiat people, also known as Darsonich (whom Count Teleki describes as being so rich at the time when he visited them), were now literally starving, having been looted by the Borans on several occasions, and having, besides, lost all their wealth of cattle through the rinderpest. Our introduction to them was as follows: Riding along the shore within about 6 miles of their villages, we saw four Reshiat men picking berries off a thick green bush. They were stark naked, except for a diddic skin hanging halfway down their backs, and a few strips of skin round their wrists and ankles. They each carried a bow, a quiver full of arrows, and a spear, and had with them a dog. They all had ostrich feathers in their hair, and one had long hair all plastered over with mud of a dirty black colour, which gave his head an uncomely appearance. In this topknot ostrich feathers were stuck. Two of them had, by way of ornament, cow-tails hanging from their elbows. These were supposed to increase their attractions in the eyes of the ladies. The only other ornament was a flat circular piece of ivory fixed to the centre of the forehead by a piece of hide round the head. This little party greeted us with smiles, and without the slightest fear or shyness they followed us to the camp, and appeared simply overjoyed to see a European. On the way I killed a hartebeest, and, having removed the skin, offered them the meat, whereupon they proceeded as follows: Carefully cutting open the carcase, they took out all the entrails, squeezed the green-coloured liquid from the contents of the stomach, and mixed it with the congealed blood and the berries they had collected, together with some leaves of the same bush from which they had got the berries. They then drank the concoction lukewarm, as if it was the greatest delicacy in the world. The berries I tasted myself; they had a rather hot taste, not at all disagreeable. The villages of these people are collections of huts of a low round shape, made of reeds. Wak is their god. They wear no clothes except a piece of skin down the back, the women indulging in one piece of goatskin. They are fond of trading, and extremely friendly with all the tribes in the vicinity as far as Lake Stefanie, but never move from the neighbourhood of the lake or river. They speak a language of their own. When raided and oppressed by the Borans, they fight with spears and poisoned arrows. They hunt very little game, although in the days of their wealth they used to kill elephant. Both sexes affect but few ornaments: besides those already

mentioned, they wear a piece of wire about 3 inches long, to which they sometimes attach a ring or two; this they pass through their lower lip. To guard themselves from capture, they wear a very sharp knife bracelet, and when fighting they remove the sheath. They do not bury their dead when killed fighting.

Although our caravan tried to dissuade us from attempting the passage of the Omo, which they said was impracticable, there being no canoes, I determined to make the attempt. I held a consultation with Andrew, the outcome of which was that we decided to separate; for, even though I should succeed in crossing the Omo with a few men, it would still be impossible to take the main caravan, with the loads and



SALT-CRATER, BORAN COUNTRY.

camels, across. We therefore arranged to meet at the south end of Lake Rudolf, Andrew taking the east coast, while I was to attempt the west. Before we separated I was fortunate enough to get a guide, who volunteered to come with me for some cloth. He said that he knew the road very well, as he had been with Dr. Donaldson Smith and with Captain Bottego. This man proved a most excellent guide, and accompanied us round the north end of Lake Rudolf until we entered the Turkana country. He was a Masai Liguenani (chief), and came up to Rudolf with the Ligop, intermarrying there with the Darsonioh.

After separating from Lieut. Andrew on March 26, I started with forty-two boys, some thirty donkeys, and a few camels, to try to cross

the river Omo, following up its left bank. During the first few days' march the donkeys were very restive, as they had never before carried loads, and galloped about in every direction, losing the loads, and sometimes requiring the whole forty men to catch them again. My progress in consequence was very slow, and I could not do more than 10 miles a day. On the second day after we started we came on some people called Legumi, who are Wandorobo, and live by hunting. They belong to the same race as the Turkana; in fact, they say they are their brothers. They lived on the south of Lake Rudolf, but came up here a few years ago to look for game and plant maize along the river-banks. Their weapons consist of bows and poisoned arrows and a long stabbing-spear. They also carry a long narrow shield, and their chiefs wear a cap made of human hair, woven and ornamented with beads and feathers, and resembling a wig placed on the top of their own hair. Every ostrich feather in this head-dress is said to denote one man killed by the wearer. The women are clothed, but the men wear only a small apron. They are a half-starved looking race. Like the Darsonich people, they drink the blood of the animals they kill. When hunting game, they roll themselves in the mud, as they say that, owing to their wearing no clothes, the game cannot scent them, and cannot see them for any distance when covered with mud. They also use traps, which they tie to trees. These consist of spikes which are fixed round the inner side of a ring, the points being free and almost meeting in the centre. The circles are of different sizes, according to the kind of animal they wish to catch. These traps are laid on the ground over a shallow hole filled with brushwood, and when the animal puts its foot in the ring, the thorns give way and allow the foot or leg to pass through, but the spikes will then not allow the leg to be withdrawn. The animal is then unable to run fast or far, in consequence of this anklet fixed round his leg.

Having come from the south of the lake, this people have never learned the language of their immediate neighbours at Darsonich, but talk a kind of Masai.

On the following day, March 28, we marched to Murle, on the river Omo. The Murle people are a regular river tribe, and have two small dug-outs for crossing the river. They sow maize on both banks in large patches. They are the enemies of every tribe around them, being a great fighting power, and enriching themselves at their neighbours' expense. Their language is absolutely different from that of either the Legumi or the Darsonich. They have not even an apology for clothes, but are absolutely naked. Their weapons consist of bows and arrows and spears, but the spear-blades are much longer than those of neighbouring tribes, being 3 and even 4 feet in length with thin blades, and a leather or wicker shield, such as is also seen among the Labuma. But their most singular weapon is the circular knife which they wear round

their wrist, similar to that described as in use among the Darsoneich. When they are not fighting, this knife is covered with hide, so that they may not hurt themselves with it. This weapon they use not only for fighting, but also to cut up their meat when they are eating. It may be described as an iron bracelet with a sharp cutting-edge outside, the blade being about 2 to 4 inches wide. Another very peculiar weapon of offence, which I did not see anywhere else, consists of a very hard stick about 3 feet long. This makes a kind of battle-axe, being fitted with a wooden blade, half-moon-shaped, and about 3 inches broad and 6 inches long, sharpened and hardened in the fire. The chief peculiarity of this weapon is that the cutting-edge is covered with tightly stretched skin. These people also wear human hair caps, like those of the Legumi.

Having seen only one Swahili caravan before, which they had driven out of the country in spite of its guns, they were at first inclined to attack us; but, as we arrived unexpectedly in the country, some of the chiefs interviewed us while the warriors were collecting. Not having seen a European before, their curiosity overcame their warlike instincts, and they remained on friendly terms with us. As already mentioned, this tribe possessed two dug-outs, but being very suspicious, as they had all their flocks and large plantations on the right bank of the Omo, it required a good deal of explanation and handing over of presents before they would lend us these canoes to cross the river. Even then I had to pay my rascally headman £100 as a bribe to proceed, before he would begin to take the caravan across.

Further north on this bank, next to the Murle, is a tribe called the Bagata, with a different language. The only crop they grow is maize. Due north of them is the Ammur tribe, still further up the river-bank.

After crossing the river, I explored up the right bank, which is densely populated by a strong, rich tribe called the Murutu. The Omo flows through a plain about 10 miles wide, on each side of which, about 5 miles from the river, mountains rise abruptly. To the northward the river apparently flows through a deep gorge, with dense forests on either bank; this gorge begins at about 50 miles from the lake. The river at Murle is from 80 to 100 yards wide, and by my aneroid, 1370 feet above the sea-level.

At its entrance into Lake Rudolf the river is at least a quarter of a mile broad, with a current of between 3 and 4 knots an hour, and, judging from its size alone, there is absolutely no doubt in my mind as to its identity with the Omo reached by travellers from the south of Abyssinia, the termination of which has so long been a disputed point in African geography. The identity of the two rivers has been virtually demonstrated by Captain Bottego, although I believe he did not actually trace the whole course of the valley.

We now turned southwards, and on April 3 marched for six hours down the river, following the right bank, through many Legumi villages

(the people being friendly), and camped on an open spot near the river. Crocodiles and hippopotami were numerous, and I shot some of the latter for the natives; my own men would not eat hippo.

On April 7 we found that we had to turn north, as we had been following a promontory which stretched into Lake Rudolf. Cutting across the isthmus, we reached the lake again at the foot of Mount Narkwa. Here the people, who are a branch of the Darsonich tribe, live almost entirely by fishing, spearing the fish by the light of a torch fixed in the bow of the canoe at night. They also do a little cultivation on the shore of the lake. The whole promontory is a plateau, the edges of which descend sharply about 100 feet to the level of the present lake-shore, which is a couple of miles broad, but was evidently at a recent period a part of the lake-bottom. Game is scarce.

On April 9 we marched across an immense plain, where I saw a herd of seurgall, or hartebeest, and, on going closer to it, saw two antelopes of another species. I was lucky enough to shoot what I now believe to be a new species of *Kobus*, though my specimens have not yet been officially described.

The next day we reached the last of the Darsonich villages, on a little river called the Errek. The people, being very friendly, gave us much information, including the last news that I heard of Captain Bottego. They said that he had been wounded by an elephant, and with some of his people stayed on the river Omo. The other Europeans and the rest of his men had come to their neighbourhood to get food and cattle from the Turkana. They had tried to march down the west side of Rudolf, but, after five days' incessant fighting, had been obliged to retire; this occurred about four months before I was there. They also told us that as soon as we got into the Turkana country we should be attacked. Between these people and the Turkana there is a neutral ground, consisting of a small plain not much more than a quarter of a mile in width. If a party of either race crosses this plain, it is taken as a declaration of war.

The Darsonich pay a sort of yearly tribute to the Turkana, in return for which the Turkana leave them more or less in peace.

Leaving next morning, we crossed the neutral territory into Turkana-land, keeping the caravan in close order, and allowing no stragglers. We saw numbers of deserted villages, the result of the Turkana raids, and eventually caught sight of some people hiding in the reeds by the lake, but, on approaching, we found that they were Darsonich fishermen, who lived in a village built on piles among the reeds 300 or 400 yards from the lake-shore. They told us that the Turkana, hearing of our being in the vicinity, had left their villages and driven their cattle up into the mountains.

On the evening of April 11 we arrived at the foot of Mount Lubur, which is one of the landmarks of the country. After a quiet night, I

took fifteen men and ascended Mount Lubur, the ascent not being accomplished without great difficulty, as there was no path on that side of the mountain. The crater on the top must be nearly 2 miles across, and in it there is good grass growing and fresh-water springs. The natives use the crater in time of war as a stronghold and refuge for their flocks and herds. There is only one path by which even goats can ascend, the sides are so precipitous. This is a dangerous and easily defended road up to the mountain. From here I was able to see down to the second island of Lake Rudolf, and to the westward, as far as the eye could reach, were great chains of mountains covered with forests. As it looked like a good shooting country, I wished to explore



THE SALT-CRATER.

in that direction, but the native guides maintained that there was absolutely no water for many days' journey, so I had to relinquish the project. At the top of the mountain my aneroid registered 5300 feet, and here I took some photographs of the surrounding country, which I will show later.

On descending next day to the foot of the mountain, we found that the men I had left in camp had been under arms all night, as the natives had tried to enter the camp under cover of the darkness.

Before proceeding further, it may be well to describe briefly the people into whose country we had lately entered. The Turkana are a vast people of about the same strength as the Borans, and are a

perfectly united nation under one big chief, whose name is Logorinyum. He is quite blind, and a very bad old man. He pretends to be a prophet, and says that he has dreams which tell him that if his men go and fight the surrounding people they will be victorious and capture a lot of cattle and camels, so he is always sending out his men and fighting the surrounding tribes, and is thus naturally very much disliked. He lives on a river called Geriu, which skirts the northern end of the mountain chain south of the Turkwell. The men are absolutely without clothing, and wear a long mat of hair, which is woven together and added to for generations, reaching very often down to their thighs. Inside this head-gear they have a kind of bag, in which they put anything they want to carry. At the end of the hair is attached a long wire, which is bent so as to come over the head, with a tassel dangling at the end of it. Higher up they wear ostrich feathers dyed in blood, one for every man that they kill in warfare. Their faces are of a long flat shape, of the ugliest type we ever came across, and, to make them still more hideous, they cover them with red and white lines. They wear ordinary copper bracelets and iron ones, like those of the Borans. Their weapons consist of a throwing-spear, stabbing-spear, and an oblong shield, which is made either of wickerwork or hide. They also always carry a native pillow and a tobacco-box made from the horn of the oryx, and decorated with cow-tail and lizard skins. Their powers of endurance are simply marvellous, and I have measured several of their strides, made when running, which have been 84 inches from heel to toe. I think they are the fastest runners of all the tribes in East Africa, being even faster than the Masai. When on the war-path every warrior is accompanied by one or more dogs, which he uses to track his enemy, as they always fight during the night-time. They also wear a wrist-knife like the Reshiat people. Their war-cry is the same as that of the Suk, an imitation of the bark of the zebra, which is so good that it is very hard to distinguish from the cry of the true animal. The tribe which suffers most from the raids of these Turkana is a prosperous and industrious one called the Rendile, who live east of the south end of Lake Rudolf and due south of the Boran country. These the Turkana not only rob of their live stock, but also carry the people themselves into slavery. Being the strongest nation in this part, they levy taxes on all their surrounding tribes.

At Mount Lubur our faithful Masai guide Loraisi implored us to let him return, as his life was now in danger if any natives saw him. Loth as I was to do so, I allowed him to go, making him happy with a present of cloth, beads, and wire.

The next day we passed several dry river-beds, and after five hours' march came opposite to a mountainous island rising abruptly out of the lake, about 3 miles long and 5 miles from the lake-shores. The island looks an old volcano, which it probably is.

On April 16 the Turkana, who had been following us night and day during our marches, succeeded, owing to the carelessness of our boys, in driving off the troop of camels and donkeys which I had been able to take across the Omo, and so had with me. Though rapidly followed, the marauders had got such a start that they succeeded in hiding away the animals in their mountain fastnesses. My search party was attacked while following the trail, but luckily, on their way back to camp, fell in with a herd of camels in the bush, among which I found one of my own marked animals.

Though often threatened by large masses of natives for the next four or five days, we were not actually attacked until the night of the 26th. As we kept close to the lake-shore, the natives never had an opportunity of surrounding us or of attacking us except on one side. We passed numbers of temporarily deserted villages, as, this being the wet season, the greater number of the inhabitants leave the low-lying land near the lake and betake themselves with their herds to the mountains. During these five or six days we passed through country at times covered with dense patches of palm trees and various creeping plants, and anon consisting of open and arid sandy flats sparsely sprinkled with thorn and spear-grass. Several sandbanks, varying only in size, run out from the shore into the lake. They are composed of loose silver sand, the largest forming a promontory which almost reaches to what I call the second island counting from the northward.

During the march of the 26th, some of my boys were attacked by the Turkana at a little distance from the caravan, and one of them wounded. That night, as I had been doing for the last two or three days, I went out on a sandspit into the lake and camped, cutting down the bush and placing it across the shore end of the bank so as to form a boma. At one o'clock in the morning the Turkana attacked and succeeded in breaking through the boma, a few of them getting into camp. We succeeded in driving them out, and, though they again attacked several times, we kept them in check till daylight, when they retired. The custom of these people is always to attack in force in the early morning. As soon as daylight broke, we arranged a kind of stretcher-bed on several of the camels, and so carried four of the more seriously wounded men fairly comfortably. We marched for five hours, continually harassed by the natives, and then, finding another sandspit running out into the lake, formed a similar camp to that of the evening before. While building the zeriba a mass of the enemy advanced to the attack, but on my charging them with half the men they withdrew, and though we could hear them in close proximity to the boma during the night, a few random volleys discouraged them from attacking us again.

During the succeeding six days the same kind of guerilla warfare continued. The enemy never came to close quarters again, as we always camped at night on sandspits, and made strong bomas with thorns.

On May 3 we luckily captured a woman, and, with her as an interpreter, got into communication with some of her friends among the hostile natives. After much palaver and a few presents, we satisfied them that we only wished to pass through the country, and had no intention of stealing anything, nor was fighting a pleasure to us; whereupon they, probably with the hope of getting rid of us more rapidly, provided us with guides. These were most acceptable, as from this point there was some difficult country, including a range of mountains, to cross, and we had still 50 miles' journey to get to the south end of the lake. By thus providing us with guides, the Turkana made satisfactory amends for all the trouble they had occasioned us.

Here, as of course you know, we were in the country which Count Teleki had already explored. Among these mountains we had great difficulty in travelling, the wounded particularly giving us trouble, as the lava and iron-bearing rock of which the mountains are composed made the road as difficult to traverse as any I had the misfortune to attempt. Our animals for some days past had had little or no food, and in consequence were scarcely able to crawl.

On arriving at the south end of the lake, I was surprised to find that Teleki's active volcano had entirely disappeared, its place being taken by an absolutely flat plain of lava. We got hold of some Ligob men who lived at the south end of Lake Rudolf, and within a couple of miles of the volcano, who told us that about six months ago the lake overflowed, and as the waters rushed towards the mountain—the native name of which is Lubburua—there was a vast explosion, after which the waters swept in where the crater had been and put out the fire. Since that time there has been no sign of the crater in that place, and there is now only a vast field of cold lava running right down into the lake; but a new crater has opened about 3 miles due south, the native name of which is Luttur. This has only just lately become active, and some of the Ligob people, who have ascended to the edge of the crater, report that there is a fire in the inside, and even we ourselves during the night could see the glare over the mountain. The new crater is as yet not more than about 130 feet high, but the cracks and crevices in the lava did not permit of our ascending.

The Ligob, just alluded to, are a very scattered tribe, who live on the shores of Rudolf and Baringo. Once very powerful and the masters of the Masai, they are now linked with the Rendile tribe under one big chief, called Legom. Their own chief is Ladunma. They are now very poor, and live chiefly by fishing, wandering about very often in pairs up and down the lake, but we found them extremely friendly and very willing to trade. They speak the Masai language. They are the only people who live on the different islands of Lakes Rudolf and Baringo, and were it not for these little strongholds they would hardly exist. One of their biggest strongholds is an island called Elmolo,

in the south of Lake Rudolf. About thirty years ago, it is said, the lake was dry at this end, and some Elmolo fishing people, of the same tribe as those who live in Alia, happened to have their village on the high ground of Elmolo, with their sheep and goats. One morning they woke up to find themselves entirely surrounded with water, and, having no boats, have been unable to reach the mainland ever since.

Continuing round the lake and going northward by the east shore, on the third day I met Andrew with the main caravan. He had followed the east shore of the lake, which he had found uninhabited, having had excellent shooting in consequence. On one occasion he had a very narrow escape from the charge of a wounded elephant. He had fired



COUNTRY SOUTH OF LAKE STEFANIE.

both barrels without apparent effect, and was forced to run on an open plain with no cover whatever. The brute was within 20 yards of him, when he broke his fetlock and came with a crash to the ground, breaking his tusk in the fall; otherwise, either Andrew or his gun-bearer must inevitably have been caught.

On leaving the south of Lake Rudolf for Baringo, we found the country exceedingly difficult; in fact, in parts we could only succeed in doing a mile after six hours' marching, having to climb almost impassable mountains. Then our guides deserted us, necessitating our sending back to the Turkana country for others. But it's an ill wind that blows nobody good. While we were waiting for guides we discovered an

entirely new sheet of water, and paid many visits to it. It lies about 30 miles due south from Lake Rudolf. Its shores are very barren, entirely enclosed by mountains, and there are three islands, apparently quite barren, near the east shore. It is fed by two rivers. What water there was in this lake was exceedingly hot, and near to the north end, where a smouldering volcano was situated, was just as hot as one would like to wash one's hands in. This volcano I propose to call, after my companion, Andrew volcano. In places where the water had dried up, the lake-bed was composed of black mud, very deep and hot, but with a hard crust over the surface. One boy that we happened to send in after a wounded Spanish flamingo, sank through this crust and scalded his foot so badly that the following day his toe-nails came off. Former high-water marks were strewn with a mass of fish-bones, and skeletons of fish, large and small, evidently killed when the water was heated. The dried-up portions of the lake are crusted with salt, and on the borders there are solid mounds of salt. There were one or two wells of fresh water here, and many sites of old villages, which we afterwards found from the natives had been deserted on account of the fire mountain, which is still active.

The altitude of the lake is 1300 feet, and the height of the volcano 1600 feet. We found that, after running north and south for about 25 miles, the lake winds round in a south-westerly direction for about 10 miles. It has an arm which we did not explore. Sugota is its native name, while that of the volcano is Sugobo. Before this became active, the lake is said to have been full of water, which was good to drink.

From here we still continued our bee-line for Lake Baringo, and experienced the most serious difficulties of our trip. We had a mutinous camp and two captured guides, of whom we were never quite sure, and exceedingly little water. The route also was barely passable, and, after having to change our loads from camels to donkeys, we were finally compelled to carry them up ourselves. If it had not been for fortunate rain-showers and a lucky find of a few puddles, we should never have got through this country.

On May 24 we camped at Inuro, and stayed there two days. On this plateau the aneroid registered 4540 feet, whilst a high mountain rose abruptly from the north-east side. We had heard that the natives, a branch of the Legup or Ligob who lived in these mountains, were friendly, but we found them timid. They were shy and would not trade—in fact, were quite unwilling to leave their mountain home, the size of our caravan perhaps scaring them. Hence we followed a winding and difficult path, and at a camp called Gemos, at which we arrived on June 2, and where a tribe of Rendile used to live, our camels first suffered from sickness. No less than forty camels in one day became unable to stand, and we thus had to leave them outside camp all night. This was not caused through fly, but, as we afterwards found, through a poisonous

bush, which we unfortunately did not notice on our arrival. Ten of these camels died or had to be shot, the remainder recovered after three days.

The country about there abounds in lions, and on June 26, at a place called Bahgar, we had a most exciting time, killing a lioness and capturing her two cubs.

On July 6 we were delighted to catch a glimpse of Baringo, and to know that we now had water for certain.

Here we had an adventure with a rhino, which came near having serious consequences. We were with our gun-bearers, I being in front, when suddenly we heard a peculiar grunt, which sounded so exactly like a lion that we halted immediately. It was Andrew's shot, and I was just getting off my mule, when, instead of a lion, out of the bush charged a grunting rhino. We were in a little gully, with a rise in front of us, a hill on our left, and a bit of thick bush from which the rhino charged on our right. About 10 yards off, the rhino made several short erratic charges, and then, unfortunately, decided to go down the narrow path along which Andrew was riding. When about 15 yards distant, the sensible mule turned tail and bolted, but before he had gone 20 yards the rhino was within a yard of him. The rhino was gaining fast, so Andrew tried to turn his mule into the bush on the left, but a mule is a mule, and he would not be turned. Andrew then threw himself off on one side, hoping the rhino would attack the mule; but no, he swerved in his course so quickly that he managed to strike Andrew in the middle of the back, but fortunately the horn only ripped up the back of his coat and shirt. After the shock he knew very little, except that he remembers lying flat and seeing a mass of clumsy legs over him. When these disappeared, he had just enough sense and strength to crawl into the bush, and was greatly relieved to find that he could even crawl. I then saw the rhino standing over Andrew and showing no signs of moving. I rushed on the animal, the men following me, all shouting, as we had no guns, and the rhino then made up his mind and charged the fleeing mule, which he came up with, but, though he knocked it flying into the scrub, did it no serious damage. We brought Andrew in a semi-conscious condition into camp; he was badly bruised, and had his knee sprained, the latter injury preventing him from walking at all for many weeks.

At Lake Baringo we were pleased to get news of white men in the neighbourhood. They eventually turned out to be Mr. Jackson and Dr. Macpherson of the Uganda Protectorate, whom we saw at the latter's station on the Eldoma escarpment. We followed Selater's road to Kibwezi, and from Kibwezi the Mackinnon road to the head of the Uganda railway, where the officials showed us every kindness, even going so far as to take our whole caravan and loads down to Mombasa by special train. This act of courtesy saved us perhaps a week's march, including the crossing of the Taru desert.

Before the reading of the paper, the PRESIDENT said: We are to be occupied this evening with one of the two great undiscovered and unexplored regions of Africa which I referred to in my first address to this Society. Since that time a great deal has been done in the first and most interesting of those two regions; nothing in the second. Only two years ago we had a most interesting paper here from Dr. Donaldson Smith, who had penetrated far into that region, and solved one or two of its problems. Since that time we have news of the important expedition of Captain Bottego, whose death we all deplore, for he was a most distinguished traveller; and now we welcome here for the first time the young traveller Mr. Cavendish, whose expedition has gone far to solve other problems connected with that region, and has brought us to the very edge of the still undiscovered portion. I will now request Mr. Cavendish to read his paper.

After the reading of the paper, the following discussion took place:—

Mr. S. L. HINDE: I had the pleasure of meeting Mr. Cavendish in East Africa when he was nearly at the end of his journey. What struck me most, on seeing the caravan arrive, was the good state of his transport animals; those that were brought through were in excellent health. In the paper to-night he said that the only time his transport animals were ill was after they had been starved. I think this point worth noticing. They came into the fertile country after having been partially starved for some time; then, being hungry, they probably ate of some of these poisonous bush-plants, which under ordinary circumstances they would not have touched. There have been great difficulties in finding transport animals in Africa; many people attributed this to the tsetse fly. For my own part, I don't think the fly, as a rule, dangerous. I fancy it only exists for two months in the year in any part of East Africa. The probable cause of many transport animals in East Africa dying is starvation; they never get proper food on a great part of the road during the dry season. When the wet season commences, all kinds of plants grow rapidly, and many animals overeat themselves. I have known twenty or thirty die in a day after going into the fertile country, though they were in perfect health along the dry ground in the desert. I think this is a point that might be noticed and looked into in regard to our transport in East Africa. I don't think that I can say anything more about the other points; there are other gentlemen present who know more about them.

Major F. D. LUGARD: As one who has been connected with East Africa, I am very glad of the opportunity to offer my very hearty congratulations to Mr. Cavendish on his plucky journey, which, I think you will all agree with me, was very remarkable—and the more remarkable and the more pleasing to us because he is the first Englishman who has traversed that country—his predecessors, one of whom we welcomed here, were Dr. Donaldson Smith and Signor Böttego, the Italian explorer. They have done excellent work, but they are not of our own nationality. The country explored is part of our own British East African Protectorate, and therefore, I think, the more British explorers that go into the country the better, provided they work in the way Mr. Cavendish worked. He was very reticent about those who had gone before him, but we gather that he met with less hostility than they had done.

Among the Borani Gallas he was welcomed, and says that he could go from village to village and get a drink of milk anywhere, for which the natives refused any payment—a country in which they could go out singly shooting without fear of attack, and yet a country where the last explorers had to fight continually. Further on were the Hamerkoke, on the west of Lake Stefanie, and with these he again established friendly relations, where the last traveller had had a serious battle. Even in the Turkana country, in which British travellers have been (Mr. Jackson

was there, but the first to enter the country was Count Teleki) and had continual fighting, Mr. Cavendish was attacked, but established friendly relations before he left. I think the more that British travellers go into that country, willing to risk their lives and spend money on these explorations, the better for British interests, provided they are undertaken on these lines.

We have heard lately—I don't know whether the statement was made on his own authority—that Mr. Cavendish is planning a second expedition. There remains a good deal of country, still further to the west, which is still unexplored by our own nation or any other, and if he elects to go into that country, we shall all agree in wishing him as great a success as in his previous expedition. That country is undeniably British, and therefore every one of our nationality has a primary right to go into it.

With regard to Mr. Cavendish's interesting paper, I noticed one point in particular—the discovery of coal. I hope before long we may see an extension of the railway to the north, when that coalfield may become valuable to the steamers on the lakes and to the railway. Another point struck me—he incidentally mentioned that the camels died of rinderpest. I have lately come from South-West Africa, where the epidemic has been raging, after having traversed the rest of the continent. I have been unfortunate in that I have followed the steps of the epidemic in both East and South-West Africa, where it destroyed the cattle and a great many species of antelope, but it is quite new to me to hear that the camel suffers.

Mr. LORT PHILLIPS: I have very few remarks to make, except to agree with Major Lugard's remarks on the paper read by Mr. Cavendish. As one of the first explorers in Somaliland in company with my late friend, Mr. James, and others, I naturally take a very great interest in the country. In those days we got no further than the Webbe-Shebili, now a route traversed and retraversed by sportsmen who have met with kindness from the natives, and I was very glad to hear to-night that Mr. Cavendish received the same treatment during his journey. I have only to agree with Major Lugard's remarks regarding Mr. Cavendish's journey.

Dr. BOWDLER SHARPE: Before this meeting separates, I would like to say, as an officer in charge at the British Museum who has had to receive Mr. Cavendish's collection, that I am sure you will be proud to hear that in all my experience we have never had such a caravan full of things come into the Museum, as the result of one expedition. I am sure Mr. Cavendish will acquit us at the British Museum on the point in his paper to-night, in which he seemed to make a reflection on us for not having worked his collection out; but since his return he has been so busy that he has not been able to give us the time necessary to help us in getting his collection into order. It occupies one side of our whale-room, and only Mr. Cavendish himself can sort this enormous mass of skulls and skins, and bones and limbs. When I do get him there, he will not be allowed to leave in a hurry, until we have got this mass of things into some sort of order, and we will then tell him the names of the animals he has brought home. Mr. Oldfield Thomas, in charge of the mammalian section, considers the collection to be of great interest, and it is interesting to hear from Mr. Cavendish's own lips to-night of the difficulties of the journey he has made, and to see the collections of horns and skins of mammals prepared by this young traveller, and brought down to the coast under such exceptionally difficult circumstances. I would merely add one remark that I have made before in this room. I do think, and I hope it will be urged in every possible quarter where any influence can be brought to bear, that it is a national disgrace to England that all our great natural history expeditions depend upon private enterprise, and that our Government does absolutely nothing in the matter. There

is no country that has interests in Africa like ours. We see little principalities annexed by the Germans, and larger ones by the French, and at once a naturalist is set to work out the fauna. Our Government should insist on scientific men being appointed, and on collections being made. No sooner was Uganda taken possession of and occupied by England than German naturalists overran it, and now our naturalists can only send us what has been already described by the Germans. This is an absolute disgrace to a country like England, and we should be entirely out of the race if it were not for the private enterprise and pluck of our own men, who go out and spend their own money in bringing home these collections.

Those of us in this room to-night who have heard Major Lugard, know that he is always trying to do something for science. Mr. Lort Phillips brings back grand results at his own expense, as also do men like Sir Harry Johnston, Dr. S. L. Hinde, and Mr. F. J. Jackson, who you will be glad to hear is recovering from his wound, and is now out of danger. But one of the best results we may hope for is that a scientific expedition, under Mr. Cavendish's direction, will now, in the same way as the expeditions of Russia and France, go in the search of science. I hope that, though he has not brought back any birds this time, I shall have great results to announce to you later on.

The PRESIDENT: It is now my pleasant duty to propose to you a vote of thanks to Mr. Cavendish for his paper. He has thrown a great deal of light on this most interesting country in several ways. In regard to Lake Stefanie, as Major Lugard mentioned, he has discovered an important feature—the existence of coal. He has confirmed correctness of the work done by Captain Bottego and Dr. Donaldson Smith in settling the question of the Omo river. He has discovered a most interesting volcanic country to the south of the lake. Perhaps the most gratifying part of the paper he has read to us was that which showed us what friendly relations he was always able to establish with the tribes he met in that wild part of Africa, and also quite as much we feel gratified at what we heard from Mr. Hinde regarding the condition of his animals when he met him on the Uganda road. These two things show that Mr. Cavendish is an excellent traveller. The most interesting photographs he showed us were the views of the unknown country to the westward of Lake Rudolf, which he described as mountain after mountain covered with forest. For it is quite unknown. I believe he heard that it was entirely uninhabited and had no water, but that is not the least likely from the description he gives of the country. We must remember that a little further north Captain Bottego penetrated still further into the unknown region, and reached the valley of the Sobat, and I think descended one of its main tributaries for a considerable distance, but he was unfortunately murdered. Well, that vast region is entirely unknown, and it is within the sphere of British influence. We therefore look forward with the greatest interest to its discovery, as we have done for the last few years. Our friend here only reached his majority last year; he is probably the youngest man who has ever read a paper before this Society. I think we may trust he has a long and useful geographical career before him, and that under his auspices that unknown region down to the mouth of the Sobat, in the upper Nile, will not long remain unknown. We have to thank him for all his interesting information, for the admirable photographs which enable us so well to understand the nature of the country, and also for the large number of curiosities and trophies of the chase which he has brought here, and which you will find in the next room. For all these things I am sure you will pass a vote of thanks by acclamation.

FOUR YEARS' TRAVEL IN CENTRAL ASIA.*

By Dr. SVEN HEDIN.

The caravan with which I crossed the plateaux of Northern Tibet consisted of twenty-one horses, six camels, and twenty-nine asses, and when I say that forty-nine of these animals, or ninety per cent., died on the way, some idea can be formed of what we had to go through. When we reached the country where pasture was scarce or was entirely lacking, one or two of our animals died every day, and their mummified bodies, which in this high, cold atmosphere do not decay, but simply dry and shrivel up, still lie there like milestones, to mark the way we passed. We had twelve sheep as travelling provisions, and three watch-dogs, one of whom, Yolldash, who would not let any one approach my tent except my body-servant, Islam, is now boarding in the most desirable comfort with the Conseiller d'Etat, Mr. Backlund, at Pulkova, where he impatiently awaits my next journey through Asia.

On this expedition I had eight permanently engaged servants, with Islam-bay at their head. Among the others I should mention Fong-shi, a young Chinese who spoke Turki, and who was going to be my interpreter in China; Parpi-bay, a Sart who had been with Carey and Dalgleish, Bonvalot and Prince Henry of Orleans, Dutreuil de Rhins (whose murder he had witnessed), and for a time had partaken in Pevtsoff's expedition; and Hamdan-bay, from Cherchen, who had accompanied Littledale on his journey across Arka-tagh. Furthermore, I had engaged for two weeks fifteen Tagliks, two of whom deserted in the very beginning of the journey. We took with us three months' provisions for ourselves, and maize enough to last the animals for one month. I had a tent all to myself, and only Yolldash was allowed to sleep by my side, but the Tagliks slept under felt carpets spread over the maize-bags, which were piled up in form of a circular wall every time we camped. It really did not matter so much that the animals died off the one after the other, for the provisions ran low in proportion; but it was distressing to see their sufferings.

On the plateau we took the following order of march. I gave orders every evening in regard to the direction in which we were to march the next day, and early in the morning the camel-caravan set out; shortly after, the asses, with the provisions for the animals; and two hours later the horse-caravan started off, soon overtaking the others, and selecting a suitable place for the night's encampment, which must be near water and pasture. Accompanied by one man only, I came last, since I was always strictly occupied with mapping, geological surveys, etc. We had some difficulty in getting across the northern border-

* Read at the Royal Geographical Society, November 22, 1897. Continued from p. 258. Map, p. 332.

mountains of the Kuen-lun chain. I had examined the Chargalik pass, but found it impossible for the camels to traverse; but we managed to cross Jappkalik (about 16,000 feet) without unloading the animals.

We then followed one of the tributaries of Kara-muran up to its sources, where the landscape already is a transition to plateau-land. Here, in one place, a picturesque group of mountains rises from the rolling country, resembling an aggregation of truncated cones with grooved sides. They proved to be horizontal beds of tufa, protecting



WATER IN SIGHT.

stratified sandstone and very hard conglomerate from weathering. The tufa is jet-black, while the rest is brick-red; and these peculiar mountains, which were hereafter by no means scarce, could be seen like beacons at a great distance. Between Arka-tagh and a little mountain range north of this mountain, we marched east-south-east, all the time looking for an easy pass. We did not succeed in this, however, before we reached the place where Littledale had found a pass, which Hamdan-bay had undertaken to show us. He could not find it, however, so we crossed Arka-tagh by a new pass (17,000 feet high), a few miles east of Littledale's pass.

The thin air had many injurious effects upon my men. During the first weeks every one was sick, and complained of headache. Already, on reaching our fourth halting-place after leaving Lama-chimin, Fong-shi was half dead, and had to be sent home to Khotan with two Tagliks. This was a fine prospect indeed; what should I do in China without an interpreter? At the fifth halting-place, Islam-bay was so ill that we had to stop three days. He thought he was going to die, and told me to go on without him, but he fortunately got better. At the eighth encampment I turned off three Tagliks, and the others, who were to go on with us, asked to be paid half of their salary in advance, and I



THE ISFAIRAN VALLEY NEAR AUSTAN.

granted their request. I was, however, rather surprised the next morning to find that all the Tagliks had deserted, and taken a dozen asses, two horses, and provisions. I did not submit to this, however. Armed with rifles and revolvers, Parpi-bay and two other men mounted our best horses and followed the deserters until they caught up with them. They were forced to go back to the camp, where the ringleader was punished, and the others were compelled to give back the money which had been paid them in advance. After this they were kept bound at night until we were sure of them. I have not time now to describe the interesting geological section which I had the opportunity of making of the parallel mountain ranges of Kuen-lun; granite, syenite, diorite, and crystalline schist are predominating. From the Arka-tagh pass we saw, far to the south, a great chain of mountains with

perpetual snow-fields and shining tops. This range is parallel to Arka-tagh, and constitutes, as I afterwards found, a continuation of Koko-shili. Its highest peak was called King Oscar's mountain, after my generous monarch and protector. Between these two gigantic chains, which run from east to west, stretches a rolling plateau, which is divided into a whole series of basins without outlet. Every such basin is bounded on the north by Arka-tagh, on the south by the parallel chain, on the east and west by small, insignificant, water shedding passes, separating the one basin from the other. In the middle of each basin there is a lake with clear but bitter water, which the streams from the surrounding mountains collect. In travelling east we discovered twenty-three such lakes, of whose existence not even the Chinese had any idea. The largest was three days long. All this part of the country was carefully mapped, and all the mountain-tops were put down on the map.

The landscape is very desolate, and when the average height reaches 16,000 feet, it is clear that vegetation must be scanty. I collected all the plants we found. They had, as a rule, rather fleshy and downy leaves, lying close to the ground in order to protect themselves from the wind and frost. The poor pasturage which was now and then found was so scattered and bitter, that the animals would not have eaten it if they had not been driven to it by hunger. The ground is, however, generally perfectly bare, and the weathering-products, which have washed down into the central parts of the basins without outlet, have, in the course of time, been disintegrated into very fine particles, so that sand and gravel are very scarce. Since the ground is damp, as a result of dew and rain, it becomes soft, and the animals frequently sank a foot deep, which fatigued them all the more. Only the lake-shores, along which we frequently travelled, were suitable for our march. The cold was not at all great, and in the daytime one could even ride without a cloak, on account of the strong insolation. At night the temperature seldom sank under 14° Fahr. The worst of all was the wind and hail. With the regularity of clockwork, the west wind came every day at one o'clock at noon, and swooped down upon the plateau-land with intense fury. The mornings were generally fine, but in the afternoon the horizon became black, a rushing, hissing sound was heard in the distance, the noise came nearer and nearer, the whole country round was enveloped in a dark fog, and we were frequently obliged to stop because we could not see where we were going. During these storms, the lakes offered a grand spectacle. High, white-crested waves, green as emerald, beat with a metallic ring against the shore. The mountains on the other side of the lake could not be seen through the fog, and one could imagine that one stood on the shore of the great ocean, to which one always has an indescribable longing when in the centre of a great continent far from the sea. These lakes were otherwise

dead and desolate; never before had their shores been trodden by human beings; and the country where they lay was just as desolate as the lakes themselves. Once or twice we saw wagtails and larks, and geese on their way to their winter quarters in India. A species of gull, of which I have brought home a specimen, was, however, very common. These gulls seemed to enjoy hail and snowstorms, for when such a storm was raging they would cover the surface of the lake by the hundred, peacefully rocking on the waves.

The only animals that were capable of putting any life into these wild, desolate regions were the yaks and khulans, and there are incredible numbers of them here. The yak-dung afforded us the very



THE CARAVAN IN THE ISFAIRAN VALLEY.

best of fuel, and every evening we could warm ourselves by fine, large camp fires. The sheep which we had taken with us soon proved to be insufficient, and when the last one had ended his days with his head turned towards Mecca, we had to shoot yaks in order to get fresh meat. Islam excelled in this sport. He provided all the men with meat, and I got the tongue, which was the tit-bit. I have brought home the skin of a magnificent specimen, a bull 11 feet long; but he was hard to shoot, that beast. He had to be given seven bullets before he would bite the dust, and the next day, when we were going to skin him, he had disappeared. We soon found him, however, not far off, walking along slowly with his nose to the ground, and there was still enough life in him for him to chase us; but after receiving four more

balls, he died in earnest. He had no less than eleven Berdan bullets in his body before he would give up the ghost. It is impossible to kill the yak instantly unless the bullet pierces his heart. If he is hit in the pelvic region, he will go about three or four days before he will die; if he gets a ball in the forehead, he will only sniff a little and shake his head; but if the ball hits him in the back or in any other place where it hurts him, he will puff and snort like a high-pressure saw-mill engine, the dust flies about his nose, he throws his tail into the air, and rushes on to the man who shot him. Thus it is a dangerous hunt. The largest herd of yaks which we saw numbered about eighty, but they are usually found in numbers of from three to eight, and sometimes solitary. The khulans are generally seen wandering about in small herds, but in the frontier mountains of Tsaidam we saw herds numbering 150. The khulan is a stately animal, a higher animal in both meanings of the word; his beautiful brown and white colouring, his noble form and powerful sinewy muscles, his high-carried head, and his broad chest well fitted for powerful lungs, give him a very attractive appearance when, as swift as the wind, he darts off with light elastic bounds across the hills of the wilderness. They contemplated our caravan with dull surprise as we slowly wended our way with failing strength towards the east, accompanied by the doleful twang of the camel-bells keeping funeral time, and, in reality, each of our hungry horses looked like the Rossinante of Don Quixote in comparison with the knightly, free khulans, who had been born and brought up in this thin air, and were accustomed to the meagre pasturage. The cry of the khulan, his long ears, his tail, with its terminal tuft of hair, make them much more resemble the ass than the horse. I have brought home a hide. The flesh is unedible, and has a very disagreeable flavour; but the flesh of the yak can be used for food, though it is as tough as gutta-percha, and must be cooked for a day or two in order to get it anywhere near tender, which may depend somewhat upon the rarefaction of the air, since water boils at about 180° Fahr.

Thus we wandered day after day across the plateaux of Tibet for two months without seeing a single living being. We found traces of man only twice during this time: at the last halting-place north of Arka-tagh, where a charred pile of coals after a camp fire showed that we were crossing Littledale's route; and between our seventeenth and eighteenth halting-places, where, in the soft sand, we still found traces of Bonvalot's and Prince of Orleans' camels, these tracks having remained undisturbed for eight years. Meanwhile our caravan dwindled down in an alarming manner; at last the men had to go afoot, and we thought that it was time to try to find inhabited country.

North-east of the last great lake, Arka-tagh showed a great incision in its summit, and by two rather comfortable passes we reached the sources of a river, which was afterwards found to be a tributary of

Napchitai-muren. On September 30 we saw the first traces of Mongolians. On the west bank of the river there was a fine *obo*, or stone cairn, raised in honour of the gods of the mountains. It consisted of forty-nine black slabs of slate, as thin and smooth as school-slates, and so placed that they resembled a stable with three stalls. They were covered on both sides with beautifully chiselled Tibetan writing-signs. Since the great pilgrimage route of the Mongolian pilgrims to Lhasa crosses just here the frontier mountains of Tsaidam, I thought that this stone book contained important historical documents, but soon found that the same writing-signs re-occurred in a defined order all the way. It was the



THE CARAVAN ON THE SUMMIT OF THE TENGIS-BAI PASS.

Tibetan creed: "On mane padme hum," which was engraved four thousand times in the stone, and it was our first acquaintance with the religious excesses of Lamaism.

When, on October 1, we went further down through the valley, we saw some grazing yaks on a spur of rock. Islam-bay stole carefully into range. After two shots had missed, an old woman came running towards us, shouting and gesticulating, and we then understood that they were tame yaks, and that we had now reached the first human dwellings after two months of solitude. The old woman took us to a tent made of nothing but rags, and surrounded by heaps of "argal" and great pieces of yaks' flesh. An eight-year-old boy was her only companion. Our conversation with this old woman was a test of eloquence. She, of course, did not know whether we were "birds or

fishes," and none of us understood any Mongolian. I knew the three words usual on the maps: *ula*, which means "mountain;" *gol*, "river;" and *nor*, "lake;" but to get the old woman to understand, by the help of this vocabulary, that we wanted, first of all, to buy a sheep, was no easy matter. So I began to bleat like a ram, and showed her a Chinese two-liang piece, and she understood me. Thus we had fresh mutton for supper this evening. Her husband, Dorchey, came back in the evening from the mountains, where he had been hunting yaks. They stay here all winter, and supply their tribe in Tsaidam with yak-meat. Dorchey was not a little surprised at seeing us, but he was a clever fellow, and became my first teacher in the Mongolian language. He was afterwards our guide across Yeekey-Tsagan-davan, in the Tsagan-ula mountains, down to Tsagan-gol in Tsaidam. Every evening I took a long lesson in Mongolian, and when we had been together a fortnight I could speak the language tolerably well, and never afterwards needed any interpreter. At Tsagan-gol I discharged several servants, and bought twenty horses.

Between Astun-tagh and the southern Koko-nor chain in the north and the Kuen-lun parallel chains in the south, extends the great basin called Tsaidam, which in physical geography has the same importance as the Tarim basin, although it is smaller, more rolling, and situated about 5000 feet higher. In its central portions there are several salt lakes, of which Dabasun-nor is the largest, and into it flow the rivers from the frontier mountains.

Around the lakes there extend great wildernesses, salt deserts, and marshes, perfectly uninhabited and sometimes impossible to cross; but along the foot of the mountains there are vegetation and pasturage, where the Tsaidam Mongolians tend their flocks of sheep and goats and herds of horses. They frequent the mouths of the valleys, where the rivers discharge, or around wells. I will give a description of the customs and life of these people in the narrative of my journey, which is to be published next autumn. They received me everywhere with hospitality. We went along the foot of the southern frontier mountains, across Bhanamaga, Hodyegor, Tsacha, Yeekey-gol, Urdu-toley, and Hattar, whence we crossed the salt desert, passing Ova-togoruk, the river Chara-ussu, and Tsaka-Tsak. All these are names of pasturages or wells, for towns and villages are entirely lacking in Tsaidam. The Mongolians live in the same kind of *yurts* as the Kirghiz.

Thus we followed the western shore of Toso-nor, where there are extensive steppes, and continued along the southern shore of Kurlyk-nor. The latter lake contains fresh water, for Baian-gol, which empties into its north-western part, passes through this lake, and continues under the name of Haluin-gol to Toso-nor, which has no outlet, and therefore is salt. At Hlakimto there is a stately *obo*, or cairn, raised in honour of the gods of the sea.

We had camped for the night on the shores of the lake Chara-nor, in whose vicinity bears are so common that the camp and the horses had to be protected by fires; and on the following day, November 1, we started for the well district, Chara-sharuin-kub. We followed a narrow path through the broad valley. Here my Mongolian guide, Loppsen, and Islam-bay discovered a fresh bear-track, and followed it. After about an hour had passed, they came back in the wildest gallop, holding their guns above their heads and crying, "Tangutian robbers;" and, sure enough, at their very heels charged a troop of twelve mounted Tangutians, all armed with long black rifles, and enveloped in a cloud of dust. It was only a moment's work to dismount, get the baggage-



RANG KUL.

horses in a protected position behind some bushes, and level our rifles ready for action. When the Tangutians found that we were quite a number, and saw our rifles gleaming in the sun, they made a sudden halt and held a council of war, after which they separated. Half of the body went up towards the mountains, and the other half rode parallel to us about two gun-shots distant, when we quietly continued our march. We had, however, a narrow rocky passage to go through, and Loppsen was afraid that the Tangutians would lie in ambush here and open fire on us. We came happily through this passage, however, and out into open country, where we encamped beside a well. At night the horses were tethered, and sentries were put on guard, with orders to beat on kettles, in order to let us, as well as the robbers, know that they were awake.

As soon as it became dark, they made themselves heard in all directions around our camp, giving wild yelps and screams like hyenas or wolves. Loppsen said this was to find out if we had dogs, and they succeeded, for our dogs barked and howled furiously until daybreak. Thus their planned attack was frustrated. The next day they followed us for some distance, but finally gave it up as a bad job. We were, however, on our guard after this. Dutreuil de Rhins had been attacked and killed in this neighbourhood, and Prjevalsky had a battle with three hundred robbers; but he had two officers, twenty-one cossacks, and a gatling-gun. I was alone with only a few natives and three rifles.

Such was our entry into the land of the Chara-Tangutians. The Mongolian name *chara*, or "black," is here synonymous to the word *mo*, meaning "bad," because the Tangutians have a bad reputation as robbers and thieves. They speak Tibetan, have the same faith as the Mongolians; they carry around the neck the same *gavos*, or case, containing *burchans*, or idols, and make the same pilgrimages to Lhasa. The present Dalai Lama is a Tangutian boy. They live in great black tents of coarse cloth, raise sheep, goats, and yaks for a living, have horses and camels, get their cereals and household utensils from Ten-kar and Si-ning, are very sure shots, and frequently plunder their Mongolian neighbours. When the Mongolians go to Si-ning or to the temple feasts in Kumbum, they always travel in large well-armed bands. The Tangutians are always armed to the teeth. At Dulan-kit we found a great Tangutian camp, and stayed there a couple of days. Here I went about among the tents with Loppsen as interpreter, making sketches and notes. They did not seem to pay any attention to us when we came in, only casting distrustful glances at us, but they were soon taken aback by my easy and cool manner.

Crossing the southern Koko-nor mountain-chain by the pass Nokaoten-kotal and the river Buhain-gol, which I forded higher up than Abbé Huc, we at last reached Koko-nor, from which lake it was still 1000 miles to Peking.

The blue lake, or the Koko-nor of the Mongolians, the Tso-ngombo of the Tibetans, and the Tsing-hay of the Chinese, is situated at an absolute height of 9975 feet, and has clear blue salt water, which gives rise to its name. The lake is frozen over three months in the year; but every violent storm causes great cracks and openings in the ice, so that pilgrims cannot ride across it to the temple on the island in the middle of the lake. They therefore make sledges, on which they take provisions and fuel for three days. They are, however, frequently hindered from reaching the island by great gaps in the ice, or they are detained on the island by thawing weather. The water-level varies much in different years. Low water propheases a good year; but when there is high water, the herds are decimated by the wolves,

the Tangutians die off in disease, and the pasturage is bad and soon dries up. In the summer the water is higher than in the winter. These irregularities have perhaps contributed to lead "Pater Huo" to think that there is an ebb and flood in Koko-nor.

Nine months before my visit, the Dungan rebels, fleeing before their Chinese pursuers, devastated the country and stole 400 sheep and 140 horses and yaks at Yeekey-ulan, but the water had been unusually high, which of course accounts for it. In several places in the Buhain-gol valley we had seen traces of the Dungan camp fires. Wherever they had gone they had devastated the country like grasshoppers.

A day's journey from the city Donkyr, where I found three of Captain



THE CARAVAN IN THE ALAI VALLEY.

Wellby's servants, lies the renowned temple Kumbum, where we arrived on November 20. It is a whole village of temples, built in motley but tasteful and elegant Tibetan style; but the main temple, Sirkang, is its nucleus, for under its roof of thick gold plates sits the god Sardinchিয়ে Tsung-kaba, fully 30 feet high, overlaid with gold, and dressed in precious silk mantles, and before this god the pilgrims throw themselves on their faces. A deep and mystical twilight reigns in this temple, but before Tsung-kaba there are five lamps burning on the floor, and in front of them stand five *jolas*, or richly ornamented vessels, containing diverse edible offerings to the god, such as tsamba, butter, cereals, water; and beside these vessels there are also lamps burning, which increase the almost Catholic mystical light effects. The temple is a perfect museum, full of other gods and innumerable volumes of holy Tibetan books. The high *lama* of the temple was condescending enough

to let me see everything, on my promising not to make any sketches. The way in which I kept this promise is shown by the magic-lantern slides.

Tsuggtjin-dugun is a temple whose outer balconies support a large number of *korles*, or prayer-mills, which are vertical cylinders which may be turned on their axles by means of cranks. They are filled with strips of paper covered with the sentence, "On mane padme hum," and the duty of certain *lamas* is to turn these cylinders and send the prayers to the knees of the gods. There are said to be about three hundred *lamas* in the temple. Bareheaded, barefooted, and beardless, clad in long red pieces of cloth, these simple-minded *lamas* idly wander about in the temples, in the colonnades and courtyards, and are ridiculous in the slavish devotions they pay to the images that they have themselves made. I also saw the tree on whose leaves, according to Abbé Huc, the prayer "On mane padme hum" spontaneously grew every year, and whose leaves are sold at a high price to the credulous pilgrims. Loppsen whispered in my ear, however, that the *lamas* painted the letters on the leaves during the night.

On November 23 we reached the strongly fortified city Si-ning-fu, whose western gate was decorated with a large number of human heads enclosed in wooden cages and labelled. I was told that they were the heads of chiefs who had partaken in the last Dungan rebellion. Dungans are Mohammedan Chinese, and when the Chinese mandarins interfered in a religious quarrel in the Salar district, rebellion broke out in December, 1894. The revolt took on large proportions, and in July, 1895, reached Si-ning, and the country people round about the city took all their movable property inside the walls for safety, so that the population increased from 20,000 to 50,000. Soon battles were fought near the city, and wounded Chinese were brought to the city, the temples of the gods were transformed into hospitals, and Mr. and Mrs. Ridley, two English missionaries who showed me the greatest kindness, had their hands full to tend the wounded. On September 1 the town, Tung-kwan, just outside the east gate of Si-ning, rebelled, and all the Chinese in the town were killed. Si-ning was beleaguered for five months, and famine and pestilences began to rage. People began to venture outside the city, in order to get fuel and food, but the Dungans always lay in ambush, and killed all who showed themselves.

The civil ruler of the city, the cowardly Dao-tai, was on good reasons suspected to be guilty of treason. After the war was ended, he was called before the emperor to receive the fine silk cord which means "Go home and hang yourself." He did not go, however, but killed himself with opium at Lan-chau. It was expected every day that the city would capitulate, and the Chinese gave their wives large doses of opium for them to swallow the very moment the city should

be taken, in order that they might not fall victims to the Dungans. But thanks be to its strong walls and excellent Djen-tai, or super-general, Si-ning held out, and in January, 1896, received succour from General Ho, who came up from the Japanese war with two thousand men. It is impossible to form any conception of the cruelties committed on both sides—small children were transfixed on lances, and the prisoners were martyred in the most outrageous manner. When the Dungan village To-ba, which has a strongly fortified position between Ten-kar and Si-ning, had held out for several months, it was obliged to surrender, but did so on the conditions that its inhabitants should be allowed to leave the town unmolested. The Chinese accepted this proposal, but required the inhabitants of the town to stack their weapons. This was hardly done before the Dungans were attacked and killed to the last man.

The populace howled like wild animals when General Ho's soldiers came back from their campaign with Mohammedan prisoners, who were triumphantly led in chains through the streets of Si-ning to Djen-tai-jamen to receive judgment, which was soon forthcoming. They were led out again, and outside the gate their throats were cut with dull knives. Then the chest of each was opened, and the heart and liver were stuck on spear-points, and thus carrying these trophies to the nearest eating-house, the soldiers had them fried and then ate them up. The Chinese believe that if they eat up the hearts and livers of their enemies, their courage will be transferred to themselves. It is said that 50,000 Chinese and as many Dungans were killed during this rebellion. Mohammedans are brave soldiers, but in this case they had bad weapons. The Chinese are incredibly cowardly. For instance, a large force of them beleaguered a Mohammedan town near Si-ning, and shot at its walls for three days, but did not dare make an attack, fearing that the inhabitants were prepared to play a ruse on them, since there were no sentinels posted on the walls. General Ho came to the scene, and had the gate blasted open. An old blind woman, the only remaining being in the town, came up and said that all the rest had fled to the mountains long ago, and she had been wondering why the Chinese had been making such a noise with their cannon outside the walls.

It was really a sad journey we had through this part of the country. For whole days we marched through devastated fields and past ruined villages and burned cities. In Tung-kwan, the streets were lined with blind old people, for when the Chinese had taken the village, they let the old people live, but blinded them.

From Si-ning, I sent home my servants from Eastern Turkestan. Only Islam-bay accompanied me now, besides the Chinese servants, and my luggage was carried on mules to Ping-fan, from which place I continued with carts to Liang-chau, where I spent the Christmas

holidays with very friendly English missionaries. A telegraph-line connects Liang-chau with Shanghai, and I therefore telegraphed to his Majesty King Oscar, and had the honour of getting an encouraging telegraphic reply from his Majesty just in time for a Christmas present. This was my first greeting in the far East from my native country.

The Chinese have their own ideas of the telegraph. They believe that the despatch is written on a piece of paper, which is rolled up and sent through the wire, and that the insulators are small halting-stations where the piece of paper can rest in case it rains.

From Liang-chau, I set off in the beginning of the new year with hired camels through the Ala-shan deserts, across Fu-ma-fu—whose *wang*, or Mongolian prince, received me politely—to Ning-sha, where Swedish missionaries have a little congregation of thirty Christian Chinese.

Our January travel through the Ordos deserts was hard. Hwang-ho, the Yellow river, lay covered with ice, and the temperature sank as low as -27° Fahr. Every day we had north-west storms, and I should have frozen if I had not had a *sholaa*, or Chinese hand-oven, up there on the back of the camel. We encamped by a well at the same time as a Dungan caravan, and in the morning it was found that one of the Dungans had frozen to death. The others asked Islam-bay to say a Mohammedan prayer over the corpse, which was laid between two stones, after which the others continued their journey as if nothing had happened.

After once more crossing Hwang-ho, it was nice to rest a few days at Bau-tu, in the home of countrymen, a Swedish missionary, by the name of Helleberg, and his wife. Mr. Helleberg had converted many Chinese, and had a school for thirty little Chinese boys, who, among other things, learned English. I went to hear a lesson in geography, and was greeted, on entering the room, with a "Good morning, sir; how do you do?" by all thirty boys in concert.

But now my patience was almost finished, and I longed for my post, which was waiting for me in Peking. After having left my caravan in good hands, and with a Chinese hurried *via* Salati, Kwei-wa-chung, Yo-ye-chung, and Kalgan—where for the fourth time I passed the great wall—to Peking, I was received with great amiability by the European ambassadors and by Li-hung-chang.

And here in the most eastern part of the middle kingdom ended my journey through Asia, from which I now have communicated a few scattered episodes.

Before the reading of the paper, the PRESIDENT said: We have from time to time heard of the work of a very accomplished young Swedish geographer in Central Asia, and on two or three occasions we have received communications from him,

but this is the first time we have had the great pleasure of welcoming him here in person. It is often said, "Poeta nascitur non fit," but it may equally well be said, and Dr. Hedin is an instance of it, "Geographicus nascitur et fit," for although geographers are often born so, it is also necessary to give them a long training. Dr. Hedin is a born geographer, and he showed this from the time that he was at school. At the age of fifteen or sixteen he made a series of maps of the arctic regions, showing the tracks of each arctic explorer, which displayed not only beauty in execution, but also very extraordinary research for a schoolboy. He made himself acquainted with all that was known of geography, studying in Sweden, in Halle, with our gold medalist Baron Richthofen in Berlin, and he became an excellent draughtsman. All the beautiful diagrams you will see on the walls were drawn by his own hand to illustrate this memorable expedition of which he is going to give us an account. He had made three previous journeys in Persia and Central Asia, so that we may naturally expect very great results from so thoroughly trained a geographer, and I must say that I have never seen work which has surpassed his in completeness and in thoroughness. Moreover, his love for geography is such that he was ready to face and overcome most desperate dangers and the greatest hardships in the pursuit of his objects, and he overcame them.

I think perhaps I ought to mention that, although Dr. Sven Hedin has addressed geographical audiences in the Swedish language, in the German language, in the Russian language, and in the French language, this is the first time he has ever addressed an English audience in the English language, and yet I think I may promise you that you will believe you are listening to an Englishman accustomed to address large audiences. It is quite certain you will hear a most interesting paper, and that it will be very beautifully illustrated both by diagrams and by photographs. I will now request Dr. Sven Hedin to address you.

After the reading of the paper, the following discussion took place:—

The PRESIDENT: In inviting a discussion on this very interesting paper, I can't refrain from expressing my sense of the very great loss we have sustained by the death of Mr. Ney Elias, only a fortnight after he was elected a member of this Council, on his return from twenty years' service in Asiatic countries. I looked upon him as being a great scholar as well as a great traveller, and as likely to become a successor of those illustrious men who used to make our discussions on Central Asian subjects so interesting. I am afraid that our Vice-President, Mr. Curzon, has disappeared in the darkness, but we are honoured by the presence of the Councillor of the Russian Embassy, M. Lessar, and I am sure the meeting will be very glad to hear his observations, if he should wish to make any.

M. LESSAR: La Société Royale de Géographie, fidèle à ses traditions, salue et encourage sans différence de nationalité tous ceux qui contribuent aux progrès de la tâche qu'elle poursuit. Bien plus encore, avec la largeur des vues d'une réunion de savants qui ont tant fait pour l'étude de notre planète, elle associe un étranger comme moi à la solennité d'aujourd'hui. J'apprécie doublement cet honneur; premièrement parceque ce n'est pas un simple voyage que nous fêtons, mais une exploration tout à fait exceptionnelle, et en second lieu à cause des liens de sincère et profonde amitié qui m'unissent au héros de ce soir. Le sort a appelé l'Angleterre et la Russie à l'accomplissement d'une grande œuvre civilisatrice en Asie. Cette coopération avec la Grande Bretagne dont nous sommes fiers, a eu, entre autres, de grands résultats pour la géographie. Mais le docteur Hedin n'ayant d'autre stimulant que la poursuite des problèmes purement scientifiques a néanmoins par ses travaux de quatre ans égalé les plus célèbres explorateurs contemporains de cette partie du monde. Ses lettres malheureusement mais inévitablement si rares lors

de son absence et surtout ce qu'il vient de nous communiquer tout à l'heure nous indiquent suffisamment quelles nouvelles lumières précieuses apportera le rapport détaillé de son voyage à nos connaissances actuelles.

Aussi je suis très reconnaissant à Mr. le Président de m'avoir invité à joindre aux souhaits de bienvenue qu'il vient d'adresser si éloquemment au Dr. Hedin mes félicitations et mes hommages d'admiration, et je crois pouvoir dire ceux de tous les géographes russes.

Sir HENRY HOWORTH: When Charles the King of Sweden was defeated at the battle of Pultawa, the heroic soldiers who had followed him from one victory to another were transported to Siberia. Among them were two famous men, one of whom was the first to give us a real picture of the geography, physiography, and ethnography of Central Asia. The book is anonymously written, but nothing like it has been written since. Now, one hundred and fifty years afterwards, we have another Swede who comes to rival, not this literary effort, but to rival the efforts of the greatest travellers of all time, following in the footsteps of Marco Polo, and the only European who has been able to follow in those steps.

What an interesting country this is! and I cannot help saying, and my friend will pardon me saying, how it would have delighted, "Pater et magister meus," Colonel Yule, one of the greatest of our scientific geographers, to have been here to-night. He had in his memory a most extraordinary store of knowledge of this district, and it seems to me, when the book is published which contains the record of these travels, we shall have added such a chapter as has never been added by one man before. The accounts of the cities buried in the sand, from which some of our English friends have discovered Buddhist manuscripts, and also brought home handfuls of coins, of which I have seen many, is full of extraordinary interest; it teaches us that along the northern slopes of that great tableland there was an Aryan population speaking a language allied to the Indian languages. Here we have for the first time some reason why these disappeared, and some reason why Marco Polo travelled this region in comparative ease, as well as many Chinese travellers two or three centuries before Marco Polo.

In these glaciers we have a kind of barometer, which shows us that the climate of the country has altered within comparatively recent times to effect this shrinking of the glaciers, this drying up of the sheets of water, which the Chinese geographers insist were to be found in the early centuries after Christ in a large part of this area, of which the great Lob-nor is merely a shrunken fragment; and here also we have a reason why so many of these old river tracks are found now to be full of dry sand. They are not merely winter torrents, but they are *bonâ fide* rivers which have shrunk into nothing. The cause is that the big lakes, etc., from which the rain could be gathered have shrunk into nothing. We have also another reason why the sandstorms overwhelmed the towns, from the fact that the rivers themselves have changed their beds, as it is the fashion for so many rivers to do on the other side of the mountains, and for exactly the same reason.

Two questions before I sit down. I am a great heretic on the subject of the wild camel, and I am bound to say Littledale and others have never quite convinced me. The opinion of some is that these wild camels are herds of semi-wild camels let loose for reasons of religion by the priests, and that they have become semi-wild, or feral, just like those wonderful camels in Australia, lost by the first great expedition, that traversed the continent from east to west and were actually found by one of my friends on the borders of Queensland. But there is another possible explanation. These rivers must have abandoned their old beds rapidly, if not

suddenly, or else the inhabitants would not have left their books and valuables. They must have left pretty rapidly, as the inhabitants near the Yellow river have to do, and in consequence large herds of camels must have strayed and become subferal.

Another question I would like to ask is, How do the birds which spend their spring and summer in Siberia find their way down to India, their winter quarters? Several men have traversed this region, and I have seen a good many of them, but they saw no live birds along the valleys at all, and it is a puzzle to know how they cross the plateaux and the Himalayas; but that they must pass over is shown by the fact that swarms of little soft-billed birds spend their summer and spring in Siberia, and in the winter are found on the other side of this tremendous plateau, with its almost impassable heights. The subject is so full of interest one might go on for ever.

I should like to thank Dr. Hedin very cordially indeed for the extraordinary pluck and endurance he showed, unbuffed by disaster, and for the delightful piece of racy and living English in which he has embalmed and enshrined his account of the journey.

Mr. DELMAR MORGAN: Let me, in the first place, pay my tribute of admiration to Dr. Sven Hedin for the admirable account he has given us of his journeys in Central Asia. Probably the most interesting of his explorations is his ascent of Mount Mustagh-ata to a greater height than has been hitherto attained by any European. But it is to his surveys and observations in the region of Lob-nor that I shall confine my remarks this evening.

About twenty years ago, the late Russian traveller, Prjevalsky, gold medallist of our Society, visited the region of Lake Lob, and placed this lake on his map, assigning for it a position about one degree too far south, according to Baron von Richthofen, who relied on the Chinese maps. The controversy which took place on this question between these two authorities was published in my 'Lob-nor.' Now Dr. Sven Hedin, a pupil of Richthofen, has discovered a lake confirming the views of this eminent geographer, and he claims that this and no other is the true Lob-nor. After studying the arguments adduced by him in support of this conclusion, I must, with every respect to one who has personally visited the region in question, be allowed to differ, and I think it would be premature to alter the position of the lake on our maps before more complete surveys have been made, especially as a recent traveller, M. Kozloff, a member of Pevtsou's expedition, passed through this country and made no change in the position of the lake, but, on the contrary, confirmed the general accuracy of Prjevalsky's observations. Among the arguments brought forward by Dr. Sven Hedin, he says that Marco Polo made no mention of the lake. But it is well known that Marco Polo mentioned very few of the natural features which he must have come across in his travels. Besides, the route he took would have taken him a considerable distance to the south of Lob-nor, and would have nearly coincided with that followed by Bobarovsky and Kozloff in order to reach Shachau. These travellers speak of a vast extent of saline swamps, marking what must have formerly been the continuation in a north-easterly direction of the waterspread of Lob-nor. The ancient lake-bed is, according to their surveys, clearly defined by ranges of mountains to the north and south, meeting at some point to the north-east of Prjevalsky's lake.

I trust that Dr. Sven Hedin will excuse this criticism of only one point in his extremely interesting paper, and accept my congratulations on the very successful journey he has made—a journey full of privations and hardships, which he seems to have borne better than the natives who accompanied him.

Dr. SVEN HEDIN: I have to offer my hearty thanks, before all other things, to the President and to the Royal Geographical Society for the friendly and honourable manner in which I have been received here, and for the friendly remarks made during the discussion. I have to thank my old and dear friend M. Lessar for his congratulations on my journey. In the year 1890-91 he received me in Bokhara, and I spent some very agreeable and pleasant days in his house. I afterwards saw him in 1893 at Tashkent, and in St. Petersburg, and I am very happy to have had an opportunity to see him here again. That gives an argument to the saying that we live in a very small planet. Sir Henry Howorth uttered some very nice words to me. As to his opinion about the wild camel, I quite agree with him. I always had an impression that the wild camels I found to the north of the Keria-daria are the successors of tame camels, and when I write in my paper that the shepherds told me that the wild camels do not fear anything so much as the smoke from the camp fires, and that when they smell the smoke they run away and do not stop for two or three days, I think that is atavism; they have the instinctive feeling that their ancestors, thirty or forty generations ago perhaps, were bound at camp fires, and now they have a feeling that human beings are their very worst enemies, and that their ancestors have been the slaves of man. I found one shepherd who had caught a wild camel only some days old, and that camel lived for a year and some weeks quite tame. Now you understand that you could not do that with a quite wild animal in a few days.

As to the routes of the birds, I do not know anything. Prjevalsky has given a very interesting explanation of the highways of the Siberian birds when going back to India. I don't remember it, as that is not my speciality; but Prjevalsky writes on the subject very ably.

Then, as to the remarks of Mr. Delmar Morgan, I did not get quite a clear impression of his opinions, and fear that I did not understand all that he said. I am glad to hear the opinion of Mr. Delmar Morgan, who has paid a great deal of attention to the Lob-nor question, but I think practical observation at the very place is more important than theory and the study of books and maps. It would be very interesting to know how Mr. Delmar Morgan, who has opinions differing from mine, explains the existence and formation of the river-bed found by Kozloff at the foot of Kuruk Yagh going eastwards as a continuation of the Tarim river; how he understands the existence of the old river-bed I found at Merdak-shahr, and another by Pevtsoff further south, and the new river-beds found by Prjevalsky? I think the river-beds give the best argument for the statement that Lob-nor is a wandering lake, and that the Tarim as well as the southern basin has moved. Only the region about the northern lake is called Lob-nor, a name absolutely unknown round the southern lake. How does he explain the absolute absence of forest round the southern lake when the whole hydrographic system of the Tarim is rich in poplar; and, lastly, the historical tradition of the inhabitants themselves, who told me that their grandfathers dwelt at a lake to the north of the southern basin? I got information from them so correctly that I could calculate that the southern basin can only be 200 years old, formed, I should think, about 1720; and in the book of General Pevtsoff, published a very little time ago, you will find proofs of the same fact.* He heard from the inhabitants of the southern basin that their grandfathers had dwelt at another lake to the north. About Marco Polo Mr. Delmar Morgan is quite

* Pevtsoff writes in his work, 'Trudii Tibetakoi Expeditsii, 1889-90,' p. 305: "The river Yarkand-darya flowed 200 yards, according to tradition, to the north of its present bed, and discharged into the small lake Ushu-kul, which is communicated by a channel with Lop-nor."

right; it is not a good argument. It is, nevertheless, very interesting to observe that Marco Polo, who passed the city of Lob, does not mention the lake Lob-nor; but that is a bad argument, because he does not mention the Yarkand-, Khotan-, and Cherchen-dariss, and he must have had a difficult passage through these rivers; and he does not mention the Kuen Lun, one of the highest mountain ranges on the Earth. I am, nevertheless, very glad to hear Mr. Delmar Morgan's opinion.

The PRESIDENT: The meeting will, I am sure, have gathered that we have only heard a very small part of the work done by Dr. Sven Hedin. He has touched upon his ascent of Mustagh-ata. You have only to look at his diagrams to see the work he did round that mountain. Look at the way he has mapped out all the glaciers that descend from it, and I may add that he spent four months on the necessary surveys. It is the same with the desert. I saw with what thrilling interest the whole meeting listened to Dr. Hedin's graphic account of the dangers he encountered and overcame in that desert, and I heard a sigh of relief from the audience when Dr. Hedin described how he heard the duck splash into the pond, and was able to fill his boots with water to take to his dying companion. There are interesting questions connected with that moving sand and the time it takes in working across the desert. Sir Douglas Forsyth gives us some interesting remarks on the rate of travel of sand, calculated from observations on buildings on the edge of the desert. All the points and questions connected with the Keria-daria and the other rivers which lose themselves in the desert, and with the supply of water, will no doubt be further treated in Dr. Hedin's book; also the discovery of entirely new country along the Kuen Lun, and his discussion of the Lob-nor question. We have now the honour of welcoming here His Excellency the Swedish minister, and I wish to say to him how truly the Royal Geographical Society feels the debt of gratitude it owes to his Majesty the King of Sweden, for having, with such enlightened liberality, sent forward or assisted to send forward so many geographical expeditions, and more especially the expedition of Dr. Sven Hedin—I believe very largely supported by the King of Sweden—and for His Majesty's appreciation of the work of geographers by recognizing their splendid journeys on their return to their native country. I am glad to say that Dr. Sven Hedin has been decorated by his Majesty, not only with the Order of the North Star, but with the order in diamonds, a distinction which I believe has only been received by three other members of that order. You will, I am sure, pass with acclamation a vote of thanks to Dr. Hedin himself, and your thanks will include not only the work that he has done in Central Asia, and the perils he has undergone for the sake of our science, but also your thanks will include the deeply interesting and admirably delivered address which we have heard this evening, as well as the numerous beautiful illustrations by himself, and the splendid diagrams he has brought over to show us, also drawn entirely by himself. I see that it is carried by acclamation; I therefore offer your vote of thanks to Dr. Sven Hedin. Some of the most interesting things he has brought back, have just been put into my hands—drawings of the patterns and figures of Buddha sitting on lotuses, which he found on the walls of that buried city in the desert.

THE ROYAL SOCIETY'S ANTARCTIC MEETING.

ON February 24 the Royal Society held one of their special meetings for discussion, at which, in addition to Fellows of the Society, other specialists are invited to take part. The subject was "The Scientific Advantages of an Antarctic Expedition;" and Sir John Evans, Treasurer of the Royal Society, who occupied the chair, intimated that the discussion should be strictly limited to the scientific advantages, and should take no account of any possible economic or political benefits which might be anticipated as a result of exploration.

The meeting was very well attended, almost all the representative scientific men in London who are interested in the sciences dealing with the Earth being present. Dr. Nansen was also at the meeting; and Dr. Neumayer, of the Deutsche Seewarte, came specially from Hamburg to add his voice to the demand for an expedition, which he was the first, now nearly thirty years ago, to urge as a necessary sequel to Ross's work. The proceedings were opened by a general paper by Dr. John Murray, whose paper in the *Journal* for January, 1894, was so complete that it is only necessary to give the following abstract of his fresh statement:—

Dr. MURRAY said: From a scientific point of view, the advantages to be derived from a well-equipped and well-directed expedition to the Antarctic would, at the present time, be manifold. Every department of natural knowledge would be enriched by systematic observations as to the order in which phenomena coexist and follow each other, in regions of the Earth's surface about which we know very little or are wholly ignorant. It is one of the great objects of science to collect observations of the kind here indicated, and it may be safely said that without them we can never arrive at a right understanding of the phenomena by which we are surrounded, even in the habitable parts of the globe.

Before considering the various orders of phenomena, concerning which fuller information is urgently desired, it may be well to point out a fundamental topographical difference between the Arctic and Antarctic. In the northern hemisphere there is a polar sea almost completely surrounded by continental land, and continental conditions for the most part prevail. In the southern hemisphere, on the other hand, there is almost certainly a continent at the south pole, which is completely surrounded by the ocean, and, in those latitudes, the most simple and extended oceanic conditions on the surface of the globe are encountered.

One of the most remarkable features in the meteorology of the globe is the low atmospheric pressure at all seasons in the southern hemisphere south of latitude 45° S., with the accompanying strong westerly and north-westerly winds, large rain and snow fall, all round the south polar regions. The mean pressure seems to be less than 29 inches, which is much lower than in similar latitudes in the northern hemisphere. Some meteorologists hold that this vast cyclonic system and low-pressure area continues south as far as the pole, the more southerly parts being traversed by secondary cyclones. There are, however, many indications that the extreme south polar area is occupied by a vast anti-cyclone, out of which winds blow towards the girdle of low pressure outside the ice-bound region. All our knowledge of the meteorological conditions of the Antarctic is limited to a few

observations during the midsummer months, and these indicate that the temperature of the snow-covered antarctic continent is even at that time much lower than that of the surrounding sea. There would appear to be good reasons for believing that the region of the south pole is covered by what may be regarded practically as a great permanent anti-cyclone, with a much wider extension in winter than in summer. It is most likely that the prevailing winds blow out from the pole all the year round towards the surrounding sea, as in the case of Greenland, but, unlike Greenland, this area is probably seldom traversed by cyclonic disturbances. But what has been stated only shows how little real knowledge we possess concerning the atmospheric conditions of high southern latitudes. It is certain, however, that even two years' systematic observations within these regions would be of the utmost value for the future of meteorological science.

From many points of view, it would be important to learn something about the condition and distribution of antarctic sea-ice during the winter months, and especially about the position of the huge table-shaped icebergs at this and other seasons of the year. These flat-topped icebergs, with a thickness of 1200 or 1500 feet, with their stratification and their perpendicular cliffs, which rise 150 or 200 feet above and sink 1100 or 1400 feet below the level of the sea, form the most striking peculiarity of the antarctic ocean. Their form and structure seem clearly to indicate that they were formed on an extended land surface, and have been pushed out over low-lying coasts into the sea. All antarctic land is not, however, surrounded by inaccessible cliffs of ice, for along the seaward faces of the great mountain ranges of Victoria Land the ice and snow which descend to the sea apparently form cliffs not higher than 10 to 20 feet, and in 1895 Kristensen and Borchgrevink landed on a pebbly beach, occupied by a penguin rookery, at Cape Adare without encountering any land-ice descending to the sea.

Is there an antarctic continent? It has already been stated that the form and structure of the antarctic icebergs indicate that they were built up on, and had flowed over, an extended land surface. As these bergs are floated to the north and broken up in warmer latitudes, they distribute over the floor of the ocean a large quantity of glaciated rock fragments and land detritus. These materials were dredged up by the *Challenger* in considerable quantity, and they show that the rocks over which the antarctic land-ice moved were gneisses, granites, mica-schists, quartziferous diorites, grained quartzites, sandstones, limestones, and shales.

The fossil remains which have been found in the Antarctic indicate in these areas a much warmer climate in past times. We are thus in possession of abundant indications that there is a wide extent of continental land within the ice-bound regions of the southern hemisphere.

It is not likely that any living land-fauna will be discovered on the antarctic continent away from the penguin rookeries. Still, an antarctic expedition will certainly throw much light on many geological problems. Fossil finds in high latitudes are always of special importance.

In any antarctic expedition magnetic observations would, of course, form an essential part of the work to be undertaken, and the importance of such observations has been frequently dwelt upon by eminent physicists and navigators. Should a party of competent observers be stationed at Cape Adare for two years, pendulum observations could be carried out there and at other points within the Antarctic, or even on icebergs. It might be possible to measure a degree on the antarctic continent or ice-cap, which would be a most useful thing to do. By watching the motions of the icebergs and ice from land at Cape Adare, much would be learnt about oceanic currents, and our knowledge of the tides would be increased by a systematic series of tidal observations on the shores of the antarctic continent,

where we have at present no observations. The series of scientific observations here indicated would fill up many other gaps in our knowledge of the physical conditions of these high southern latitudes.

In regard to the depth of the ocean immediately surrounding the antarctic continent, we have at present very meagre information, and one of the objects of an antarctic expedition would be to supplement our knowledge by an extensive series of soundings in all directions throughout the antarctic and southern oceans. It would in this way be possible, after a careful consideration of the depths and marine deposits, to trace out approximately the outlines of the antarctic continent. The depths found by the *Challenger* in the neighbourhood of the antarctic circle were from 1300 to 1800 fathoms, and further north the *Challenger* soundings ranged from 1260 to 2600 fathoms. To the south-west of South Georgia, Ross paid out 4000 fathoms of line without reaching bottom. In the charts of depth which I have constructed I have always placed a deep sea in this position, for it appears to me that Ross, who knew very well how to take soundings, was not likely to have been mistaken in work of this kind.

The deposits which have been obtained close to the antarctic continent consist of blue mud, containing glauconite, made up for the most part of detrital matters brought down from the land, but containing a considerable admixture of the remains of pelagic and other organisms. This gives place further north to diatom ooze, and then red clay. Since the views, however, as to the distribution of deep-sea deposits throughout these high southern latitudes are founded upon relatively few samples, it cannot be doubted that further samples from different depths in the unexplored regions would yield most interesting information.

The mean daily temperature of the surface waters of the antarctic, as recorded by Ross, to the south of lat. 63° S. in the summer months, varies from 27·3° to 33·6°, and the mean of all his observations is 29·85°. His mean for the air during the same period is somewhat lower, being 28·74°. In fact, all observations seem to show that the surface water is warmer than the air during the summer months. The *Challenger* observations of temperature beneath the surface indicate the presence of a stratum of colder water wedged between warmer water at the surface, and warm water at the bottom.

In the greater depths of the Antarctic, as far south as the antarctic circle, the temperature of the water varies between 32° and 35° Fahr., and is not, therefore, very different from the temperature of the deepest bottom water of the tropical regions of the ocean. The presence of this relatively warm water in the deeper parts of the antarctic ocean may be explained by a consideration of general oceanic circulation. While these views as to circulation appear to be well established, still a fuller examination of these waters is most desirable at different seasons of the year, with improved thermometers and sounding-machines. Indeed, all deep-sea apparatus has been so much improved as a result of the *Challenger* explorations, that the labour of taking observations has been very much lessened.

In the surface waters of the antarctic regions there is a great abundance of diatoms and other marine algæ. These floating banks or meadows form primarily not only the food of pelagic animals, but also the food of the abundant deep-sea life which covers the floor of the ocean in these south polar regions. Pelagic animals, such as copepods, amphipods, molluscs, and other marine organisms, are also very abundant, although species are fewer than in tropical waters. Some of these animals seem to be nearly, if not quite, identical with those found in high northern latitudes, and they have not been met with in the intervening tropical zones.

A peculiarity of the tow-net gatherings made by the *Challenger* Expedition

in high southern latitudes, is the great rarity or absence of the pelagic larvæ of benthonic organisms, and in this respect they agree with similar collections from the cold waters of the arctic seas. At present we have no information as to the shallow-water fauna of the antarctic continent; but, judging from what we do know of the off-lying antarctic islands, there are relatively few species in the shallow waters in depths less than 25 fathoms. On the other hand, life in the deeper waters appears to be exceptionally abundant. An interesting point connected with the benthonic fauna and flora of these high southern latitudes is that, as with pelagic organisms, many of the species are identical with, or closely allied to, those of the arctic regions, and are not represented in the intermediate tropical areas. The *Challenger* researches show that nearly 250 species taken in high southern latitudes occur also in the northern hemisphere, but are not recorded from the tropical zone. Fifty-four species of seaweeds have also been recorded as showing a similar distribution. Bipolarity in the distribution of marine organisms is a fact, however much naturalists may differ as to its extent and the way in which it has originated.

What is urgently required with reference to the biological problems here indicated is a fuller knowledge of the facts, and it cannot be doubted that an antarctic expedition would bring back collections and observations of the greatest interest to all naturalists and physiologists, and without such information it is impossible to discuss with success the present distribution of organisms over the surface of the globe, or to form a true conception of the antecedent conditions by which that distribution has been brought about.

There are many directions in which an antarctic expedition would carry out important observations besides those already touched on in the foregoing statement. From the purely exploratory point of view, much might be urged in favour of an antarctic expedition at an early date; for the further progress of scientific geography, it is essential to have a more exact knowledge of the topography of the antarctic regions. This would enable a more just conception of the volume relations of land and sea to be formed, and in connection with pendulum observations some hints as to the density of the suboceanic crust might be obtained.

In case the above sketch may possibly have created the impression that we really know a great deal about the antarctic regions, it is necessary to re-state that all the general conclusions that have been indicated are largely hypothetical, and to again urge the necessity for a wider and more solid base for generalizations. The results of a successful antarctic expedition would mark a great advance in the philosophy—apart from the mere facts—of terrestrial science.

No thinking person doubts that the Antarctic will be explored. The only questions are: When? and By whom? I should like to see the work undertaken at once, and by the British Navy. I should like to see a sum of £150,000 inserted in the estimates for the purpose. The Government may have sufficient grounds for declining to send forth such an expedition at the present time, but that is no reason why the scientific men of the country should not urge that the exploration of the Antarctic would lead to important additions to knowledge, and that, in the interests of British science, the United Kingdom should take a large part in any such exploration.

The DUKE OF ARGYLL, who was unable to be present, sent in writing his views as to the bearing of antarctic research on the problem of the glacial period. After pointing out that the study of Greenland has not solved the problem of the movements of an extensive ice-sheet, and after indicating the diverse views on this subject held by geologists, he concluded: These questions, and a hundred others, have to be solved by antarctic discovery; and until they are solved we cannot

argue with security on the geological history of our own temperate regions. The antarctic continent is unquestionably the region of the Earth in which glacial conditions are at their maximum, and therefore it is the region in which we must look for all the information attainable towards, perhaps, the most difficult problem with which geological science has to deal.

Sir JOSEPH HOOKER said that next to a consideration of the number and complexity of the objects to be attained by an antarctic expedition, what dwelt most in his imagination was the vast area of the unknown region which is to be the field for investigation—a region which in its full extension stretches from lat. 60° S. to the southern pole, and embraces every degree of longitude.

The appearance of the circumpolar pack girdling the ocean about the antarctic circle naturally suggested questions as to its origin, to none of which could a fuller answer be given than that the floating ice-fields originated over extensive areas of open water in a higher latitude than they now occupy, that they are formed of frozen ocean water and snow, and that winds and currents have brought them to where we now find them. The other great glacial feature of the antarctic area is the ice-barrier which Ross traced for 300 miles in the 78th and 79th degree of south latitude, maintaining throughout its character of an inaccessible precipitous ice-cliff (the sea-front of a gigantic glacier) of 150 to 200 feet in height. It probably abuts upon land, possibly on an antarctic continent; but to prove this was impossible on the occasion of Ross's visit, for the height of the ship's crow's-nest above the sea-surface was not sufficient to enable him to overlook even the upper surface of the ice. The speaker saw no other method of settling this important point, except the use of a captive balloon, an implement with which he hoped future expeditions would be supplied. There were several occasions on which a balloon might have been advantageously used by Ross when near the barrier, and more when it would have greatly facilitated his navigation of the pack. He regarded the biological possibilities of an expedition as likely to commence a new epoch in that science.

Dr. NANSEN laid stress on the importance of exploring the antarctic land. He doubted whether Dr. Murray's theory of a continuous continent was correct; possibly there was only a number of groups of islands. But there was no doubt that the ice-sheets were far more extensive than that of Greenland, and the study of them would yield more important results. He did not foresee any difficulty in reaching the antarctic ice-sheets. Ice-navigation was now much better understood than in Ross's time, steam-power of itself giving an inestimable advantage, for it was just when the ice-pack was open in calm weather that a sailing ship was unable to attempt to navigate it. The risk of being caught by the ice and shut up for a length of time was much less in the south than in the north polar regions, for the open ocean all round would reduce the probability of severe pressures in the pack. Captive balloons would prove of great value. The importance of pendulum observations on the ice-sheet was very great, and he did not believe that the nature of the ice would make travelling difficult once the surface of the ice-sheet was reached. He thought, however, that it was possible that the thickness of the ice-sheet might be so great as to interpose serious difficulties from the effects of altitude alone, for the height might probably be as much as 20,000 feet. He hoped that a British expedition would be sent out, and that expeditions from other countries would co-operate with it by simultaneous observations in other parts of the area.

Dr. NEUMAYER strongly urged the importance of insisting on the purely scientific point of view in inaugurating a new expedition. The determination of the gravity constant at a number of points within the antarctic circle was of high

importance, and the International Geodetic Commission had expressed their conviction that a gravity survey in that region would be of the greatest benefit to higher geodetic theories. The study of terrestrial magnetism also demanded a great number of observations in the antarctic area. While the theory of terrestrial magnetism had been placed by Gauss on a very high level, physical observations remained sadly behind. The south polar area promised much more interesting results than the north; the distribution of magnetism seemed to be simpler, but it was scarcely known. It was interesting to notice that the two foci of maximum magnetic intensity were situated to the south of the Australian continent, where magnetic storms were extremely numerous and strong; whereas on the opposite side, the circumpolar stations of 1882-83 at Orange bay and South Georgia showed a remarkably small number of disturbances. Similarly, while a great number of instances of aurora displays were recorded at Melbourne and in the seas south of Australia in 1882-83, none were seen in South Georgia. From every point of view, an expedition to study the magnetic phenomena in the far south was eminently desirable, and he trusted that the work would be carried out simultaneously by expeditions from several countries.

Sir CLEMENTS MARKHAM said that, from the geographical point of view, it was sufficient to point out the vast extent of the unknown area, and to state that no region of like extent in any part of the Earth had ever failed to yield results of practical as well as of purely scientific interest when it was explored. In the case in point, the little we know of the antarctic region indicated unerringly the very great importance and interest of the results which are certain to attend farther research. The extent and position of the land masses, the relative extents of ice and water, and the amount of volcanic activity in the region, were all scarcely hinted at as yet. Combined together, the prospective benefits which antarctic exploration would confer on all branches of science make the discovery of the unknown parts of that region the greatest and most important work that remains for the present generation of explorers to achieve.

Dr. A. BUCHAN limited his remarks to the single important point of the relation of atmospheric pressure to the prevailing winds. He stated that, according to Ferrel's theory of atmospheric circulation on the globe, as set forth by Prof. Davis, an area of low pressure existed over the south pole, towards which surface winds blew in on all sides. But the observations of all antarctic expeditions which had crossed the polar circle showed that the barometer continued to rise as they proceeded southward, and that the winds blew, with scarcely an exception, from a southerly quarter or outward from the pole. This indicated that a region of high atmospheric pressure was central over the south pole, and the climate there ought to be free from excessive precipitation, and favourable to exploration. Were Ferrel's theory correct, the excessive precipitation which would necessarily result would render the antarctic region almost inaccessible to the most intrepid explorer. A well-equipped antarctic expedition was necessary in order to make observations, which should fix the position of the great ring of low atmospheric pressure surrounding the globe in the southern ocean, a feature as important in oceanography as it was in meteorology.

Sir ARCHIBALD GEIKIE said that geologists would hail the organization and despatch of an antarctic expedition in the confident assurance that it could not fail to advance greatly the interests of their science. It would throw light on the nature of the rocks forming the antarctic land, and on the evidence these rocks contain bearing on the history of climate in the past. It would let us see the extent to which the known fossiliferous formations can be traced towards the poles, and the bearing which they have on the evolution of terrestrial topography. The

history of volcanic action in the past would also be elucidated, and the conditions under which it is now continued in the polar regions. It might be seen whether in high latitudes vulcanism, either in its internal magmas or superficial eruptions, manifests peculiarities not observable nearer the equator; what is the nature of the volcanic products now being ejected; and other important points. Again, the influence of antarctic climate on the rocks exposed to its action, and the effects of contact between ice or snow and streams of lava. Finally, the study of the physics of antarctic ice would be of value with regard to the history of the ice age in northern Europe and America.

Dr. P. L. SCLATER, although not looking on the antarctic regions as particularly favourable for zoological work on the higher land vertebrates, felt that an expedition would be very valuable. There was doubtless a rich marine and sea-bird fauna which ought to be investigated; but he regarded the most promising field to be the palæontological. The few fossils obtained from the far south were very interesting, and further finds would be sure to lead to valuable results.

Prof. D'ARCY W. THOMPSON spoke enthusiastically of the wealth of the field of zoological research in the antarctic regions. He pointed out that all we know of the deep-sea life of the antarctic area is the result of eight hauls of the dredge on the *Challenger*; but these dredgings were the very richest of the whole cruise. He could not accept Dr. Murray's "bipolar theory" of the distribution of species as proved, and wished to see it tested by an expedition. Even if that theory were broken down, antarctic explorations would lead to other generalizations, not less interesting, to take its place.

Sir W. J. L. WEAFTON, in a few words, pointed out that if an expedition under naval discipline were decided on, it would be extremely popular amongst both officers and men.

Sir JOHN EVANS, remarking that the meeting had been prolonged to an hour unprecedented in the records of the Royal Society, expressed his gratification at the high level maintained in the discussion, and said that all were unanimous in the belief that immense advantages to science would result from a new exploration of the antarctic regions.

DR. HASSERT IN UPPER ALBANIA.

A RECENT number of the *Verhandlungen* of the *Gesellschaft für Erdkunde* of Berlin contains an admirable account of an expedition into the wilds of Upper Albania by Herr Dr. Kurt Hassert, which reminds one so frequently of the familiar narratives of exploration in the north-western frontiers of India, that it is almost impossible to believe that it refers to a country within a few hours' sail of Brindisi.

Dr. Hassert's journeys in Montenegro, in 1891 and 1892, filled him with a desire to penetrate into the happy hunting-grounds of European exploration; but one delay followed another, and it was only in the beginning of June, 1897, that he landed at Medua, the port of Skutari, in company with his former fellow-traveller, Dr. Antonio Baldacci, of Bologna. The way from Medua to Skutari crosses alternate bogs and sand-dunes to Alessio, and enters the plain of the lower Drin as a mere bridle-path. Under more favourable auspices this district might become fruitful exceedingly, but at present it is little more than a worthless, fever-stricken morass.

Skutari itself, under similar improved conditions, might become a trade centre of high importance. The fertile plain is surrounded by great mountain ranges, which enclose a lake navigable for small steamers and connected with the sea by

the navigable river Boyana. Direct communication could thus be opened up, *via* Skutari, between the richest parts of Montenegro and the ocean; and the lake of Skutari itself abounds in fish. For the present, however, Skutari confines its attention chiefly to rudimentary agriculture, and manufactures carried on in the houses of the inhabitants.

The Wali at Skutari, although "ein sehr zuvorkommender und gebildeter Mann," could not undertake the responsibility of allowing travellers to start for the interior of the country without special authority from Constantinople. Thanks to the excellent relations existing between the German and Turkish governments, the necessary permission was not difficult to obtain; but delays were unavoidable, and, in the mean time, Dr. Hassert and his friend made short reconnaissances in which the want of Turkish recognition was not severely felt, as Turkish authority is little more than a name except in well-known and accessible parts there was no occasion to visit. An Albanian in the service of the Italian consulate, named Nikola, proved an excellent dragoman, and Turkish gendarmes and other officials were "lent" more to spy than to protect. Still, it must be admitted that Dr. Hassert was fortunate in being allowed into the interior at all.

Upper Albania compares very unfavourably in the facilities of travel with Montenegro, being, indeed, one of the most inaccessible regions in the whole of European Turkey. There are no roads and few bridle-paths; and the male part of the population is almost exclusively occupied in fighting with and plundering their own neighbours, or the Turkish authorities, or the Montenegrins; the ecclesiastical establishments offer the only refuge to travellers. These conditions are, of course, to some extent susceptible of geographical explanation; the coast is nowhere deeply indented, and the region can only be reached by crossing a series of barrier ridges. The interior is completely filled by the Dinaric "fold" mountains, forming a network of deeply cut valleys and high narrow ridges, crossed by few passes.

The first recognized journey from Skutari was to the Zukali range; a small tributary valley of the Kiri was ascended, an excellent view of the mountains of Southern Albania was obtained from the summits Mulesife and Mali Zukalit (6040 feet), and the return route to Skutari lay through entirely new country. The second and longest journey began after an ascent of Maranaj (5170 feet); the course of the Drinasa was ascended to its junction with the Drin, and the Mirdites country entered by crossing the latter river. A difficult march brought the travellers to Orosi, the Mirdite capital, where they were hospitably received by the Eminence Primo Docchi. His eminence is practically king of that country, and has travelled much in North America, India, and Europe. We learn that he regaled his guests with *Munchener Bier*. From Orosi Dr. Baldacci returned to Skutari, while Dr. Hassert continued his way eastwards, followed to the Mirdite boundary by an ensign attached to one of the district garrisons, who hoped to confiscate his maps and sketches, but was deterred by fear of the clerical escort provided. The Liuma country proved even more dangerous travelling, and Dr. Hassert only breathed freely when the main road from Skutari was again reached. This highway, a narrow bridle-path, ascends the gorge of the White Drin until it opens on the plain of Prisen.

Prisen lies picturesquely at the northern base of the Shar Dag. The consulates and similar establishments are situated in the upper town, looking down on the "native" quarters, with their five and twenty minarets, and to the fields of Ipek and Djakova beyond. Somewhat larger than Skutari, Prisen is one of the busiest and richest of the Oriental towns, carrying on various manufactures, and even boasting a municipal water-supply; but trade is much hampered by the constant raids from the Liuma country. The inhabitants are Roman Catholic, Orthodox,

and Mohammedan, the last-named faith gaining ground steadily at the expense of the others; but notwithstanding a devoutness easily raised to fanaticism, there is evidence of an undisturbed heathenism but thinly covered over. Dr. Hassert tells an amusing story of how the children play about in the churches during mass or sermon, and if one becomes too uproarious the officiating clergyman thinks it not undignified to lay the youngster across his knee and administer suitable correction.

The return journey to Skutari was made by the ordinary road, which has lost much of its importance since the development of the Macedonia railway system. It follows the narrow valley of the Drin till that river takes its great bend northward, below the junction of the Black and White branches, when it cuts across mountain and valley to the great serpentine plateau of Puka. The Turkish government is at considerable trouble to keep this road open, providing escorts between the numerous block-houses along the line of route.

Shorter journeys followed into the wilder mountainous regions, during which Dr. Hassert collected much topographical information, and gained much insight into various modes of political education practised in Turkish territory by Austria and Russia, chiefly in connection with the Roman Catholic and Greek Church organizations. It would seem, however, that little or nothing can be done in or with the country until the universal blood-feud system is abolished. At present all work is done by women. Dr. Hassert was even forced at one time to travel under the protection of an elderly matron; the men do nothing but seek revenge upon each other.

Ultimately the Turkish authorities indicated that Dr. Hassert had made enough sketches and photographs and measurements, and that he had better be off. A final excursion across the Boyana into Montenegrin territory, with an ascent of Rumija (5220 feet), accordingly concluded the expedition.

NOTES ON A SECTION OF NORTH MEXICO.*

By J. GURDON L. STEPHENSON.

ON December 23, 1896, an expedition left England for North-Western Mexico. The map herewith represents a portion of their work. Guaymas, on the Californian gulf, was reached on January 24, 1897, and two days later the party proceeded down the coast for some 200 miles in a small sailing-vessel, chartered for the occasion. At Topolobampo the expedition landed, and from thence the general direction followed was as shown on the map. The instruments made use of were practically those recommended by Mr. Coles in 'Hints to Travellers.'

Frequent observations were taken as the expedition proceeded, and sketch-maps were made of the country traversed. Altitudes were taken with the boiling-point apparatus and the aneroids. Besides the best maps obtainable of the country which were made use of, Mr. J. Fewson Smith, the engineer of the Rio Grande Sierra Madre and Pacific Railway, most courteously placed his survey plans at the disposal of the author.

An excellent chart of Topolobampo harbour, by the United States Navy, exists, and examination showed that the bay can, by the expenditure of a comparatively small sum of money, be made into a fairly good port. The depth of water on the bar is now 2½ fathoms, the rise of the tide being from 4½ to 6 feet. The question

* Map, p. 464.

of the improvement of this harbour is now being considered by the Mexican Government.

Stretching northwards for some 30 miles is an immense plain, which is fertile even under the primitive cultivation of the natives. This plain can be easily irrigated by the Fuerte river, and in places land has been taken up by American colonists. Much of it is now covered by trees of great variety, and samples were obtained of *lignum vitæ*, logwood, rosewood, mahogany, walnut, ebony, and many other woods suitable for cabinetwork. At San Blas are low hills, and a bar of rock across the river; here the gold belt commences, and stretches north as far as La Junta; several placers are worked by Mexicans and Indians in a very primitive way, and there are some good quartz veins in the hills. Near La Guasa there are sandstones and limestones containing fossils, while south of Fuerte is a belt of broken country, some 10 miles in width, showing frequent outcrops of schist, slate, and syenite. In the neighbourhood of Huites are extensive beds of auriferous gravel, which have been protected from denudation by sheets of recent lava. Near here one meets the foothills of the Sierra Madre, and a very short distance brings us into the mountain range itself. Throughout the district there appears to be no evidence whatever of glacial action; the valleys and gorges are very narrow, and their sides very steep.

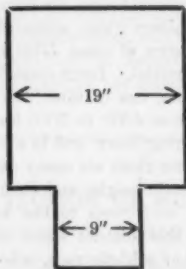
To the north of Batopilas, however, between the river Urique and the river Guajochic, on the eastern slopes, some peculiar bowl-shape hollows in granite were met with, which were taken to be examples of the "glacial mill." The country at this place has the appearance of glacial action, the hills being rounded, and the slopes of the valleys flatter, whilst boulders which appeared to be ice-marked were met with. Batopilas is a mining town of some 5000 inhabitants, the mines being worked chiefly with American capital. Large quantities of silver have been, and are being, taken from these mines, one of them, the San Miguel, being over 900 feet in depth. At a height of from 4000 to 5000 feet the pine forests commence, oaks of three varieties also occurring below and in a few instances above this elevation; they are generally small, but there are many oaks of 15 inches diameter.

Pines run from 60 to 100 feet in height, and from 15 to 24 inches in diameter, there being usually about ten such trees to the acre, with many smaller and occasionally larger trees. In this district there are said to be some 12,000 Tarahumari Indians—a small but athletic race, whose power for travelling long distances in a short time is immense. These Indians hunt down the deer on foot. They live chiefly on corn, which they grow in the river-bottoms, and their houses are built of logs, each house usually having a small stone annexe, in which their corn is stored. Comparatively few of them now dwell in caves, the latter being now used only by the poor, and occasionally by young married couples, who have not yet built their hut and got their own piece of land cleared.

These Indians prepare the land for cultivation by girdling the trees; the stumps are afterwards burnt out, and the trees used as fences, for building their huts, or for firewood, and sometimes they are burnt *in situ* to get rid of them. The ground is ploughed by oxen with a wooden plough. The Tarahumaris possess considerable numbers of ponies, rather good-looking small cattle, and small rough sheep, from the wool of which the women weave blankets. Each settlement has its own "governor." The punishment of stealing is fourfold restitution; whilst a murderer has to support the widow of his victim until she dies or marries again, and, in the case of children, until they are able to support themselves. There are numerous cave dwellings along the Guajochic river, which formerly were used as burial-places, the corpse being placed upon the ground in a sitting posture, with a bow, arrows, and a gourd of meal beneath it, in the case of the male, rough weaving

implements being substituted for the bow and arrows in the case of the female. Now when a death occurs in any of their huts, the Tarahumaris at once desert it and build another, the corpse being buried for three days, after which it is taken up from the ground by the medicine man, who kills some animal by the side of it, and dismisses the souls of both to heaven; the carcase of the animal, cow, sheep, or goat, according to the position of deceased, goes to the medicine man, whilst the corpse is buried in shallow ground, from whence it is dug up and eaten by coyotes.

In lat. $30^{\circ} 10' N.$, long. $108^{\circ} W.$, there is a very perfect cave dwelling, a plan and description of which were presented to the British Museum, together with some relics removed therefrom by the author in 1897. This cave dwelling is at the head of a small cul-de-sac cañon. About 50 feet from the ground in the rock, which is here almost precipitous, occurs a rift or hollow, which bears traces of having been enlarged by the hand of man. This rift is from 7 to 8 feet in width, thus giving the same height to the cave-dwelling. The hollow goes back for a distance of some 14 or 15 feet from the face of the rock; this dimension, less the width of two walls and an outside gallery, being the width of the dwelling. All the walls are built of concrete, the outside one extending the whole length of the rift, and being pierced with splayed loopholes for arrows, and with doorways. Immediately behind this wall runs the gallery, about 3 feet in width, on the further side of which is another wall of lighter construction, pierced with openings of the following shape:—



About 12 inches from the floor, which consists of a hard cement concrete, is the bottom or sill of the doorway, which here measures 9 inches each way. At a distance of 9 inches from the sill the doorway widens to 19 inches, while the height of the whole opening from sill to lintel is 28 inches—the opening, in short, consisting of a 19-inch square resting on a 9-inch. The object of the peculiar shape of these openings, at first sight puzzling, is readily understood when one goes through them, the body passing easily through the 19-inch square, while the feet follow through the 9-inch. Frequent party walls of concrete, most of them pierced with similar openings, divide the interior into several small rooms. Some skeletons were found beneath the concrete floors in these rooms, each being wrapped first in wool, wound about with a fine cloth, then a coarser cloth, and finally the whole was enveloped in coarse matting. An olla containing very finely ground corn meal, several corn cobs of a very small size, weaving implements, the remains of bows and arrows, and some curious black pottery, were found with the skeletons, while hair and some dried flesh still remained on one of the skulls now to be seen at the British Museum. Access to the cave-dwelling is obtained by means of holes, cut in zigzag fashion on the face of this rock, just big enough to admit the fingers or

tees. Near this place, in many of the gullies, exist the remains of large stone terraces, evidently constructed as soil dams, the ground above these being used afterwards for gardens, some of which are cultivated to the present day. Going east from Bocoyna, a small town on the eastern slopes of the mountain, are extensive llanos, upon which many cattle are grazed, and Cusiuhiriachic, a mining camp of considerable importance, situated in a barranca below, is passed. At Coyachic there is a considerable amount of land under cultivation, which is irrigated from the river, and the country from thence to Chihuahua is barren and stony, with here and there fertile valleys. North of Bocoyna are a series of small hills; the country is well watered, and several large ranches exist.

Between Guerrero, a town of about 2000 inhabitants, in a good agricultural and mining centre, and Casas Grandes, the country consists of elevated plains with occasional low rocky hills; there are several cultivated villages, and at Balle an extensive Mormon colony, with numerous green fields, gardens, and plantations.

The Casas Grandes, Boca Grande, and Diaz valleys, which lie between Casas Grandes and the international boundary at Columbus, are fertile, and have also been partially taken up by Mormons; but the country to the east of Lake Guzman more resembles that traversed by the Mexican Central Railway, and in the dry season, at any rate, does not look inviting.

THE CAUCASUS.

THE last volume of the *Memoirs* of the Caucasian Branch of the Russian Geographical Society (vol. xviii.) contains a number of papers full of interest.

M. N. Alboff, who has been engaged for several years in the study of the flora of Western Caucasus, in that part of the range which runs along the Black Sea coast, gives further results of his important work. In 1894 he made two very interesting excursions in that part of the range, and now gives, first, the diary of his excursions, and next his extremely interesting observations and conclusions relative to the flora of that region as a whole, and the flora of the limestone crags in particular. The paper is accompanied by a map, $6\frac{1}{2}$ miles to an inch, of the Chernomorsk district, and the western part of the Sukhum *otdyel* (independent district). The first excursion was made to the Akhakhcha, the Kytsyrkha, and the neighbouring mountains; and the second, which lasted sixteen days, to the mountains Arashkha and Adzituko. This last excursion was especially full of interest, as regards new topographical observations and botanical collections. Full lists of plants collected, several of which are new (while some, like the new species named *Campanula regina* by the author, are of rare beauty), are given, as also a comparison between the limestone-crag flora of Abkhasia, Chernomorsk, and Mingrelia.

The interesting Tartar stem of the Kumyks is the subject of an anthropological sketch by M. Pantukhoff, containing a discussion of their origin, and some anthropological measurements.

In a paper on the Highlands of the Chechenes, Madame A. Rossikoff gives a detailed account of her journey in that part of Daghestan, which is the more welcome, as up till now there is no complete geographical description of the region, and the very villages are marked inaccurately on the maps. The mountaineers, who fought so brilliantly under Shamil, are also little known. Madame Rossikoff begins with the beautiful plateau or terrace of Vedefi (last stronghold of Shamil); then she describes the Chaberloi plateau, the valley of the Keri, the gorge of the Argun, and the pass Ityn-kul. A map, $3\frac{1}{2}$ miles to the inch, accompanies the paper. Several samples of Chechen folklore are given.

An interesting note concerning the Pshaves and their land, contributed by M. Khizanashvili to a Caucasian paper, is reproduced in this volume of the *Memoirs*.

Two papers are devoted to climatology, namely, one on the precipitation in Caucasia in the summer of 1894, illustrated by two maps, by A. Woznesensky, and another by K. Rossikoff, on the glaciers and the lakes of the northern slope of the main range, in which measurements of both the glaciers and the levels of the bases in 1893 and 1894 are given.

In the domain of statistics, we find four detailed papers, containing a full statistical description of the government of Baku, and statistical data relative to the provinces of Erivan, Daghestan, Kutais, and Elisabethpol; and in the domain of ethnography a splendid atlas of eight ethnographical maps of each separate province of Transcaucasia, on the scale of $13\frac{1}{2}$ miles to an inch, is published by E. Kondrutenko, as well as a note concerning these maps.

The numerical data contained in V. Cuinet's work, 'La Turquie d'Asie' (1890-94), concerning the Armenian population of Asia Minor, have been utilized by General Zelenyi and Colonel Syssoeff to draw a detailed map ($33\frac{1}{2}$ miles to an inch) of Turkish-Armenia and Kurdistan, giving the percentage of Armenian population in each of the vilayets and the districts of the region. Besides, detailed tables, showing the distribution of Armenians in Transcaucasia, are given by the editors.

The twenty-third volume of the 'Collection of Materials for the Description of Localities and Inhabitants of Caucasia' (*Sbornik Materialov*), which continues to be published by the Caucasian School Administration, contains a number of interesting papers, including an elaborate description of the Kuban province, by L. Y. Apostolov; papers on the Mennonite settlements, and on the ancient town of Majary; and a variety of smaller notes.

EAST SIBERIA.

THE last numbers of the East Siberian Branch of the Russian Geographical Society which have reached us (xvii. 1 and 2, 1896; and xviii. 3, 1897) contain an excellent review of the expeditions which were sent out by the Russian Geographical Society and its Siberian branch for the exploration of Siberia during the last fifty years, as also the yearly reports of the East Siberian branch for the years 1894, 1895, and 1896.

We learn from the latter that the exploration of the Khangai mountains was made by D. A. Klements, for the Academy of Sciences. The upper course of the Khoitu-Tamir was explored in 1894. The great range consists of granites and quartz porphyries, covered with clay slates and other metamorphic slates. A few beds of conglomerates are found on the outskirts. A formidable development of volcanic activity took place in the south-east and south-south-east Khangai, probably during the Tertiary epoch. At the sources of the Ongghien and the Orkhon, hundreds of miles are covered with almost uninterrupted flows of lava. The valleys of the Khangai are well populated, and old stone graves are numerous everywhere. Parts of the Gobi-Altai were also explored, and it appeared that the Baga-Bogdo and the Artsy-Bogdo are two quite distinct ranges. The Gobi-Altai is dry and thinly populated, the breeding of camels being the chief occupation of the natives. Surveys for 1860 miles, and bulky collections of plants and insects were brought in. In the year 1895, Klements crossed the Western Khangai, and discovered a miniature glacier. In the Ubsa-hor depression he discovered layers containing coal and forest plants, which were sent to the Academy of Sciences.

A considerable sum of money having been put by M. Sibirakoff at the disposal of the Siberian branch for the description of the Yakutsk region, an exploration on a grand scale was organized, in which about twelve persons took part. The aim is to thoroughly explore the ethnography, the anthropology, and the economical conditions of the Yakut and Tungus populations of this immense province. The exploration has been busily carried on during the last three years, and an immense mass of materials, anthropological (partly published in the *Memoirs*), ethnographical, linguistic, and economical, is already accumulated. Some of the explorers, as S. Kovalik, being thoroughly acquainted during many years of exile with their respective regions, have proceeded most systematically in their work, which promises to be of very great value. A Yakut Dictionary has been compiled by one of ten exiles, E. Pekarsky, who has learned the Yakut language as his mother-tongue, and has had at his disposal all linguistic material hitherto published, or accumulated at Irkutsk in manuscript, or collected by the Yakutsk expedition. The means for publishing this important work were also given separately by M. Sibirakoff.

The relics of the Stone age near Irkutsk were explored by Dr. Eleneff. Under a layer, about one foot thick, of humus, and above the alluvial layer which covers the local sandstone, rich collections of stone implements, made of slate and quartzite, were found—namely, about a hundred arrows, mostly flat and triangular, but partly also pyramidal; stone awls, about a hundred cores, nearly two hundred chisels, small hatchets and fine scrapers, from three thousand to four thousand splinters, and about thirty pieces of pottery, embellished with engraved and sculptured ornaments, were found in the same spot.

Six seismoscopes have been established in different parts of Transbaikalia for the study of earthquakes.

The January number of the *Geographische Zeitschrift* contains a short note on the work carried out since 1895 under the superintendence of M. Obrucheff, with a view to the detailed study of Transbaikalia in its physical and geological aspects. M. Obrucheff himself undertook the exploration of the south-western portion of the region. The whole district between Kiachta and Lake Baikal in the west and the Yablonoi range in the east is a mass of mountains, in which only the valleys of the larger streams and lakes form level depressions. The ridges are composed of crystalline schists, metamorphic and eruptive rocks; while the valley floors consist of coal-bearing strata, probably of Tertiary age, and Post-Pliocene lacustrine sand. Magnetic iron ore is fairly plentiful, but the coalfields will not repay working, at least in the immediate future. The region between the Yablonoi range in the west and the rivers Onon and Argun in the south and east was examined by A. Gerassimoff and J. A. Gedroitz. Here the valleys are at a lower elevation, and larger plains exist on the Mongolian frontier, though a general mountainous character is maintained. Crystalline rocks still predominate; but Palæozoic, Mesozoic, and Tertiary formations occur, and eruptive rocks occupy large areas towards the south. A variety of metals are found, and some of the coalfields would repay working. Statistical investigations, dealing with questions of land tenure and the proportion of cultivable land, have also been carried out by M. Kulosmin.

THE MONTHLY RECORD.

THE SOCIETY.

Vasco da Gama Celebration.—A preliminary meeting of the British committee, formed to assist in the celebration in May next at Lisbon of the fourth centenary of the discovery of the Cape route to India by

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Vasco da Gama, was held on March 21 at the rooms of the Royal Geographical Society. Sir Clements Markham presided, and there were also present Sir A. Rollit, M.P., Sir G. Birdwood, Sir D. Tennant, Sir Charles Lawson, Sir Eyre Massey Shaw, Sir George Taubman-Goldie, and others. The Portuguese Minister, Sir Luiz de Soveral, and the Royal Commissioner and Governor-General of Mozambique were also present. The chairman referred to the great geographical interest of the event which would be celebrated in Lisbon on May 17 to 20, and said that a dinner and also a meeting would be held in connection with the celebration in May at the rooms of the Royal Geographical Society, at which the Prince of Wales and the Duke of York had promised to be present. Sir A. Rollit said it had been arranged to hold a meeting in May at the India Office, over which the Secretary of State had promised to preside, and the Department had also sent charts and plans to the exhibition at Lisbon. Resolutions of congratulation to the King and people of Portugal upon the occasion were passed and were cordially acknowledged by Sir Luiz de Soveral, and a sub-committee was appointed to carry out the arrangements.

EUROPE.

Exploration in the Eastern Caucasus.—Mr. Maurice de Déchy, Hon. Corr. Member R.G.S., writes that he travelled last year in the high mountains of the Eastern Caucasus, to continue the exploring work which he began many years ago. He was accompanied by two Tyrolese guides. The north side of the Pirikitelian chain was first visited, whence the Khevsurian Alps were reached and explored. The north foot of the Pirikitelian chain was visited in 1894 by the indefatigable Caucasian traveller and explorer, Dr. Radde, but glacier explorations above the snow-level were not undertaken (see "Der Nordfus des Daghestan," *Erganzungsheft No. 117, zu Petermanns Geogr. Mitteilungen*). In 1892 a German traveller, Herr Merzbacher, made a long and successful exploring journey on the south side of the chain, and ascended some of its highest peaks (see *Geogr. Jour.*, vol. i., 1893, p. 63). The inner Khevsurian Alps, whose wild mountain chains, as stated by Dr. Radde, no European traveller has ever crossed, remained a *terra incognita*. On the journey of Mr. de Déchy, the glaciers of the side valleys, which belong to the river system of the Argun, were explored. They all show signs of retreat. The highest peak of the Pirikitelian chain, Datakh Kort (14,020 feet), was ascended, from a camp in the Donoilam valley, and a second bivouac, higher up on the sides of the Datakh glacier. The chain was crossed by a pass at the head of the Kachu glacier, Kachulam pass (11,650 feet), to the valley of the Pirikitelian Alasan. In the Khevsurian Alps great difficulty was experienced in laying down the route to be followed in the proposed exploration. A series of high passes from east to west were crossed; the Anatoris-gele (about 10,000 feet), the Kalatonis-gele (10,175 feet), the Shibu-gele (11,212 feet), and the Inkvari-gele (about 11,200 feet). The whole region consists of slates (mixed, towards the west, with calcareous sandstones). The aspect of the Khevsurian Alps is quite different from the Central Caucasus and from the adjacent mountain groups towards the east, the Tebulos group and the Perikitelian chain. The valleys are dreary, stony; the vegetation poor; the peaks comparatively insignificant, but the height of the saddles great; the glaciers small, and the snowfields in general very unimportant, despite the great

height of the ridges, whose steepness may account for this. On the journey geological and botanical collections were made; the botany is under determination by the learned explorer of the Caucasian flora, Prof. Sommer, in Florence, who has already determined the phanerogams collected on Mr. de Déchy's preceding expeditions. A large series of photographs of the scenery and the people were taken.

Submerged Rock-valleys in England.—In a recent paper to the Geological Society on "Submerged Rock-valleys in South Wales, Devon, and Cornwall," Mr. T. Codrington described various valleys in which the solid rock is reached at a considerable depth below sea-level, on the sides of Milford haven and in the haven itself; beneath the Tivy, Tawe, and Neath, the Wye, the Severn, the Bristol Avon, the Dart, the Laira, the Tavy, the Tamar, and other rivers. In the case of the Dart, the rock bottom has been found at one place at a depth of 110 feet below low-water level, and in the case of other rivers at varying depths less than this. The deposits show that some of the infilling took place after the period of submerged forests, and much before this, for frequent cases of glacial deposits filling the bottoms of these submerged valleys are recorded. The fact that in the Solent and Thames the glacial deposits border the sides of the valleys, and do not occur at the bottom as in the case of the valleys described in the paper, indicates that the latter are older than the former, though they present features similar to those of some of the valleys of the north-east and north-west of England. In the discussion of the subject, Mr. Strahan considered that the description given of valleys filled with mud to so great a depth below sea-level emphasized the fact that the land must have stood at a considerably higher level in comparatively recent times, not only in South Wales, but all round our coasts. Mr. C. E. de Rance pointed out that these submerged valleys in South Wales and the south-west of England were excavated by rain and rivers before the glacial episode. He stated that similar valleys in North Wales, Cheshire, and Lancashire occur at depths of nearly 200 feet below the mean tide-level, and are filled up to the existing height with undoubted glacial deposits, through which post-glacial valleys have been excavated $1\frac{1}{2}$ mile wide, and 180 feet deep. Mr. J. E. Clark called attention to two important points which the paper seemed to establish. The submergence in the south-west exceeded that in the south-east, exactly as had been shown between North-Western and North-Eastern England, and again in Western and Eastern Scotland. The deeply submerged peats and tree-stools indicated, again as in the north, that the post-glacial recovery brought the land-level almost to normal pre-glacial conditions. But its brief duration was strikingly shown by the York central plain. If the glacial beds were stripped away, there would now be a vast inland sea, hundreds of square miles in extent, reaching beyond York, whereas the post-glacial Ouse had only time to cut a narrow, 70-feet-deep gorge through the present site of the city.

The Site of the Ancient Noreia.—The position of the old town of Noreia, famous in connection with the first inroads of the Cimbric and Teutonic invasions into the lands which now form the south-west portion of the Austrian empire, is the subject of a lengthy disquisition by Fritz Pichler in the *Mitteilungen* of the Vienna Geographical Society (1897, Nos. 9 and 10). After first briefly recapitulating the work of previous commentators, who have brought forward no less than eighteen different places as claimants for the honour of identification with the ancient capital of the Taurisci, the writer carefully examines the question from all points of view, and arrives at conclusions differing from any suggested by previous writers. Noreia, which formed the centre of a gold and iron yielding district to the south of the Danube, is supposed to have given its name to the province of Noricum, inhabited by the Taurisci or Norici. According to Polybius, Strabo, and others, it was the scene of the defeat of the Roman Consul Carbo by the Cimbric in B.C. 113, and was

besieged by the Boii in B.C. 59. Later on it drops out of notice, and during the Roman occupation of Noricum the chief centre of the province was Virunum, situated in the valley of the Glan, in the neighbourhood of the modern Klagenfurt. A Noreia was, however, introduced by Castorius into the 'Tabula Peutingeriana' (A.D. 365-366) as a post-station in upper Styria, and here, therefore, the site of the ancient Noreia has frequently been placed. Herr Pichler enters minutely into a variety of questions, such as the relation of the topography of the country to the military details, the history of the mining industries, the centre of the Noreia-cult (the name was also applied to the patron deity of the land) as revealed by inscriptions, and finds that everything points to the Glan valley as the site of the ancient town. He therefore concludes that, as Caesar knew nothing of Virunum, while Pliny, who speaks of Virunum, knew nothing of Noreia, the two places were on one and the same spot, the name having been changed by the Romans when they established themselves in the country. The Noreia of Castorius will in this case be a totally different place, a post-station of later times, of which no mention is made previous to A.D. 363.

Displacements of the Confluence of the Loire and Vienne.—M. Louis Laffitte has an interesting note in the *Annales de Géographie* (November, 1897) on the subject of the changes which appear to have taken place within historic times in the régime of the rivers flowing through the "Val d'Anjou" (known also simply as "Val'ée"). This valley, now one of the richest and most fertile districts of France, but formerly a swampy and unstable tract of country, is composed of alluvial soil, forming as it were a gulf between the higher and older lands which bound it. At the present day the Loire and Vienne, the two principal streams which debouch on this alluvial tract, unite near its upper end, at Candes; it has been thought, however, from the statements of old chroniclers, that the junction formerly took place much lower down—Gilles Ménage, who wrote in 1683, considering that in the eleventh century the two rivers joined opposite Saint-Maur. Some writers have even held that the Authion, which now flows in a separate furrow parallel to the Loire on the north, marks an old bed of the latter river; whilst others, e.g. Bodin (1812), assign a parallel course on the south to the Thouet, which now joins the united Loire and Vienne at Saumur. Both these suppositions are, according to M. Laffitte, erroneous. He explains the statements of the chroniclers by supposing that the present course of the Loire between Candes and Saint-Maur went sometimes by the name of one, sometimes by that of the other of the component streams. There seems to have been a series of islands or other obstacles which prevented their complete union at once, whilst from a geological point of view the section in question forms rather the continuation of the Vienne than the Loire, the latter river having in time carried the day owing to its greater volume. Even now the Vienne when in flood makes its colour perceptible as far as Saumur, and the boatmen of the present day use the two names according as they navigate by one or the other bank.

ASIA.

The Mihran of Sind.*—Major Raverty has here presented his readers with a study of comparative geography of great complexity and importance: the question of the modifications and changes through which the Indus and its tributaries have passed in the course of centuries. The most conspicuous of these changes are the disappearance of the "Mihran of Sind," or "Sind Sagar,"

* 'The Mihran of Sind and its Tributaries: a Geographical and Historical Study.' By Major H. G. Raverty, Bombay Army (retired). Reprinted from the *Journal*, Asiatic Society of Bengal. Calcutta: Baptist Mission Press.

which flowed east of the Indus, and retained as its tributaries the waters of all the rivers of the Punjab, from the Chetang to the Sindhu, or Ab-i-Sind, and the conversion of the Ab-i-Sind, or Indus, into the main stream. This westerly trend of river-courses is a process not unfamiliar to geographical students, and elaborated, if we remember right, by the physicist Von Baer. Major Raverty has devoted his attention more to the historical side of the question, and in the 353 pages of the present treatise, he reviews in the greatest detail all authorities, devoting by far the most attention to Oriental authors. The work is scarcely adapted for detailed review, and in any case would require maps to illustrate any critical or other remarks. But the influence of the physical changes will be the more readily appreciated when we bear in mind that some of them were so considerable that they reduced a vast extent of once fruitful country to a howling wilderness, and that flourishing cities and towns became ruined or deserted by their inhabitants. The elaborate disquisitions on all the principal historical events are given with all the author's usual minuteness; in fact, we should almost have preferred a more condensed treatise with the main facts indicated in greater prominence. But no one can fail to appreciate the author's extraordinary industry, and the care with which he has scrutinized the original texts of his Oriental authorities, whether published or in manuscript. There are several maps attached to the monograph, but their clearness appears to have suffered in the process of reduction from the author's original scale, and the omission by the lithographer of any explanatory dates, showing what particular years or ages they illustrate, somewhat mars their usefulness.

Mr. Thomson's Photographs of China.*—Mr. John Thomson, whose services to the Royal Geographical Society as instructor in photography have led in no small degree to the improvement recently observable in the illustrations of books of travel, has just published a work which will be widely welcomed. Mr. Thomson made an extensive tour through China about twenty-five years ago, and published a selection of his photographs on his return in four large and costly volumes, entitled 'Illustrations of China and its People,' the letterpress of which was confined to notes on the pictures. The new work, although based on the same journey, is quite a different book. It gives a series of chapters, which have been written in the light of recent occurrences, on the condition of China, the Chinaman abroad and at home, and on some of the more important districts of China. Canton and the province of Kwang-tung, the treaty ports, Shanghai, the Yang-tse-kiang, and Northern China are described, and a particularly detailed account of Formosa is given, with an appendix on the aboriginal dialects of that island. While the book will be read with interest, the value attaching to the illustrations is certainly the most striking feature of the work. The original negatives were taken by the old laborious wet-collodion process, the manipulations of which demanded the utmost skill and dexterity; but the results in the hands of an expert were far superior to those attainable by the easy dry-plate process of to-day. In China pictures taken many years ago show the same features which now present themselves to the eye, and the same which were visible to the first visitors from the west. It is a case where one can photograph the past. The hundred examples of his art chosen by Mr. Thomson are now reproduced as half-tone blocks for the first time, and the result is remarkable. The public is so much accustomed to see traveller's photographs taken hastily, preserved carelessly, and developed badly, that the carefully selected standpoints, artistic grouping, and perfect technical finish

* 'Through China with a Camera.' By John Thomson. With nearly 100 illustrations. Westminster: A. Constable & Co. 1898.

of these prints will be to many a revelation of the power of the camera in making real the scenery and the people of distant lands.

Shantung and Kiauchau Bay.—On the head of the German occupation of Kiauchau bay (which Baron von Richthofen maintains in the *Verhandlungen der Gesellschaft für Erdkunde*, Berlin, 1898, p. 71, is the only correct spelling—in German, of course—Kiautschou), has issued a pamphlet entitled 'Kiautschou, seine Weltstellung und voraussichtliche Bedeutung' (Berlin: 32 pp.), the main purpose of which appears to be to put a check to exaggerated expectations with regard to the results of this step. Baron von Richthofen maintains that the only commodity likely to form, in the first instance, an important article of export is the excellent coal of Shantung, and that Kiauchau cannot be expected to make any rapid progress till it has been connected by rail, at least, with Wei-hsien and Tainan, and in the end with the great Peking-Hankow line of the future. In noticing this pamphlet, the editor of *Petermanns Mitteilungen*, considering that it is twenty-nine years since Baron von Richthofen has been in Shantung, thought it well to consult Mr. Otto Anz, who has just returned to Europe from Northern China, where he has been devoting himself more particularly to the wild silk industry. The results of this inquiry are briefly communicated in the February number of the periodical mentioned. Mr. Anz considers that in several particulars the views of Baron v. Richthofen do not correspond to the present situation, and believes that the establishment of an open port at the mouth of the bay would at once give a great stimulus to the export of raw silk from the mulberry moth, as well as from the oak-moth (the *Atheræa pernyi*), to that of tissues made from the product of the oak-moth, and to that of straw braid. In the last two decades this last industry has undergone a very important development in Shantung, especially in respect of quality. Mr. Anz also points out that the steady silting up of the Chinese ports on the Yellow sea which is going on, is likely to tell more and more in favour of Kiauchau, a harbour always open, even in winter. The communication is accompanied by a map, on the scale of 1 : 750,000, of Kiauchau bay and the neighbourhood, largely based on a Japanese authority, and containing a number of names not to be found on any map yet published in Europe.

AFRICA.

The British East Africa Protectorate.—The report by Sir A. Hardinge, presented to Parliament in December last, supplies a useful summary of the history of the East African Protectorate since its formation in July, 1895, and the progress made in its organization and development. A map added to the report shows clearly the boundary of the Protectorate with that of Uganda, as well as the administrative areas into which it is divided. The boundary alluded to runs from the neighbourhood of the "Natron lake" in the south to the Likipia escarpment towards the north, bending eastwards, however, so as to leave Lake Naivasha and the portion of the rift valley immediately to the south of it within the Uganda Protectorate. The four provinces which have been so far constituted (Seyyidieh, Ukamba, Tanaland, and Jubaland) are divided each into several districts, presided over by a European (named the "District officer"). These are in turn described by Sir A. Hardinge, with a sketch of their characteristic surface features, and an enumeration of the principal tribes included within them. One section of the report deals with communications. A satisfactory point noted is, that in various districts around Machako's the natives are beginning so greatly to appreciate the advantage of good roads that they have offered to construct new ones at their own expense. Ukamba, the least civilized province, is the best provided with roads, the communications of the coast provinces being largely carried on by sea, while

the presence of the *tsetse* fly prevents cart transport by animals. The supply of porters, derived chiefly from Mombasa, Rabai, and Teita, does not equal the demand, and a large proportion of the goods received in Uganda is despatched through German territory. As regards river navigation, it is hoped that small steamers may shortly be provided, both for the Tana and the Juba. The slave-trade now flourishes only in two regions of the interior, Kitui, in Ukamba, and Somaliland. The historical retrospect for each of the four provinces for the first two years after the formation of the Protectorate is in the main satisfactory. The rebellion in the Seyyidieh was not an unmixed evil, as it led to the breaking, once for all, of the power of several influential Arab potentates. In Ukamba, the intertribal wars and raids which have hitherto prevailed are being steadily suppressed.

AMERICA.

The Canadian Expedition to Hudson's Bay.—During the summer of 1897 the Canadian Government took a further step towards solving the question of the practicability of the Hudson strait route to Central Canada, by the despatch of a scientific expedition to determine the length of time within which the conditions of the ice would permit the navigation of Hudson bay and strait during the summer months. We hope shortly to receive a detailed account of the expedition, but meanwhile the following particulars will be of interest. The *Diana*, a wooden whaling steamer, left Halifax for the north on June 3, having on board Dr. Bell and Mr. Lowe, of the Geological Survey. Much ice was encountered, and on attempting the entrance of the strait the ship was beset, and was for a time in great danger during a storm. The scientific members were afterwards landed for the purpose of exploring on the north and south sides of the strait, while the steamer cruised in various directions. The strait was now found to be free of ice, with the exception of a bank against the north coast. A visit was paid to the fishing-stations in Cumberland sound, in the east of Baffin Land, where one or two Europeans were found living a wretched life among the Eskimo. Hudson strait was afterwards successfully traversed, and a visit paid to Fort Churchill, after which Dr. Bell and Mr. Lowe were again taken on board, and the ship proceeded for supplies to St. John, Newfoundland. The strait was again visited in October, and only on the 30th of that month did ice begin to form in the bays, the passage still remaining free. Much good work was done by the land parties. Dr. Bell found the north side of the strait strewn with islets, and bordered throughout the summer with an ice-field. He made an expedition into the interior of Baffin Land, discovering the large lake reported by the Eskimo to Dr. F. Boas. Mr. Lowe executed a survey of the south coast of the strait, as far as the George river in Ungava bay, and found the existing maps very inaccurate. Both observers agree that the strait is open for steam navigation for at least sixteen weeks in the year, while its meteorological conditions are decidedly more favourable than those of the Strait of Belleisle.

The Rio Capim, Para, Brazil.—A preliminary account of a journey to the upper course of the Rio Capim, the river that joins the Guajara at the town of Pará, is given by Dr. Emil A. Goeldi in the February number of *Petermanns Mitteilungen*. The expedition set out from Pará on June 15, on board the Government steamer *Lauro Sodré*, which was to take them as far as the fazenda of Apronaga at the end of the pororóca section of the lower Capim. Thence they proceeded in a private steamer called the *Ondina*, drawing 6½ feet even when lightened as much as possible. This deep draught proved unfortunate, for the steamer could not go up beyond the lowest rapid (above Acaryuçana), which was reached on June 28. A rocky barrier there crosses the river from the right bank, leaving only a narrow

channel free on the left side, and in that channel a depth of only 5 to 5½ feet above a bed partly occupied by sharp-edged and pointed rocks. The party had consequently to make the rest of their way in canoes. They were without instruments for the exact determination of their position, but Dr. Goeldi believes that they ultimately reached about 3½° S., 48½° W., on the upper Capim, and he states that, were it not for the unfortunate obstruction offered by the rapids above Acaryuçana—which, however, could be overcome with little difficulty and at little cost—the river would form a splendid waterway to the frontier of the state of Maranhão; for the Surubijú, the right head-stream of the Capim, is said to be deep, and to permit of navigation by small steamers a long way up. Between Apronaga and Acaryuçana twenty-nine tributaries were counted on the right, twenty-six on the left, bank.

Exploration in the Southern Andes.—Two Chilean expeditions have set out for the exploration of the Andes to the south of 42½° S. One of these, under Dr. H. Steffen, set out from Santiago on December 14 to explore the Cordilleras on both sides of the parallel of 44° 30' S., between the Aisen in the south and the Palena in the north, the principal aim of the expedition being to reach the great lake-region of Argentina containing Lakes La Plata and Fontana. The other, under Dr. P. Krüger, started from Puerto Montt early in January, with the view of exploring the Cordilleras in the neighbourhood of 43° S. The expedition is to ascend the Rio Corcovado from its mouth, and to ascertain whether it is identical with the Futaleufu, which was explored last year from the lake whence it issues to the colony of October 16. If it succeeds in its aim, the exploration of the main water-parting in the latitude of 42½° S. will have been completed. The expedition is well provided with material and instruments (*Petermanns Mitteilungen*, February).

Exploration in Tierra del Fuego.—Dr. Otto Nordenskjöld contributes to *Petermanns Mitteilungen* (September, 1897) a preliminary notice of the Swedish expeditions of 1895-97 in Tierra del Fuego. In the zoological work Dr. Nordenskjöld was assisted by Dr. Ohlin, and in the botanical work by Herr Dusén, the Argentine authorities lending effective aid in the way of transport and otherwise. The full reports are to be published shortly in a special memoir; meanwhile, Dr. Nordenskjöld gives a new map of the region, a descriptive account of its extremely interesting and complicated topography, and sufficient of the more striking scientific results to indicate that the difficulties and risks encountered by the explorers have not been without due reward. Any contribution to our knowledge of the most southerly inhabited portions of the globe gain, of course, a special significance from a comparison with the known conditions of the northern hemisphere, a comparison remarkable while we restrict ourselves to the sea, but probably still more so when we extend it to dry land. The expedition made collections with trawl and tow-net at thirty-seven stations, and collections of land, fresh-water, and shore forms at about forty stations. Several of the localities have never before been visited, and the specimens of typical forms are therefore likely to be of peculiar interest. The same is true of the botanical collections, especially of the Cryptogams. Notwithstanding its limited area, the region has shown itself to be one of great complexity, and this fact will almost certainly be reflected in local variations of both fauna and flora. The geological collections show that in Tertiary times the climate of Tierra del Fuego was slightly warmer than it is at present; these conditions were followed by a glacial period, during which the islands were covered, and the straits of Magellan filled up, although the ice never reached beyond the parallel of 52° S. It might seem that this result was not in accordance with observations in sub-tropical regions, but the ice period was probably associated with a general subsidence of the land. Towards its end, Tierra del Fuego was probably 200 feet below its present level, although there is little or no evidence of elevation actually going on at present.

It is well known that many species of animals found on the northern side of the straits of Magellan are unknown in Tierra del Fuego; the observations of the expedition show that the list of these is much more extensive than has been supposed, and that it includes reptiles, frogs, and many invertebrates. Many plant-forms of different families exhibit the same sharp demarcation, showing that the straits of Magellan date back to a remote period, a fact abundantly supported on other grounds. The work of the Swedish expeditions serves to still further emphasize the scientific importance of an exploration of the antarctic continent, and it will prove a valuable aid in the interpretation of the information we may hope one day to possess concerning that more remote region.

AUSTRALASIA AND OCEANIC ISLANDS.

The Cambridge Expedition to Torres Straits and Borneo.—This expedition, under the leadership of Dr. A. C. Haddon, Professor of Zoology in the Royal College of Science, Dublin, sailed on March 10 for Torres Straits. The party consists of Dr. W. H. R. Rivers, St. John's College, Cambridge, Lecturer on Experimental Psychology at Cambridge, and at University College, London; Mr. S. H. Ray; Dr. W. McDougall, Fellow of St. John's College, Cambridge, and of St. Thomas's Hospital, London; Dr. C. S. Myers, B.A., Caius College, Cambridge, and Bartholomew's Hospital, London; Dr. C. G. Seligmann, of St. Thomas's Hospital, London; and Mr. A. Wilkin, of King's College, Cambridge. The work of the staff will be distributed as follows: Dr. Haddon will be responsible for the observations on the physical characteristics of the natives, and will continue his researches on their decorative art. Their language and phonology will be studied by Mr. Ray, the well-known authority on Oceanic languages. Drs. Rivers, McDougall, and Myers will initiate a new departure in practical anthropology by studying comparative experimental psychology in the field; Dr. Myers also paying especial attention to native music. The hygienic and medical aspects of anthropology will be studied by the four medical men. Dr. Seligmann will act as naturalist to the expedition; one of his duties will be to identify all the animals and plants which are utilized by the natives in any way. After a stay of some few months in the straits, some of the party have accepted a very generous and enthusiastic invitation to visit Mr. C. Hose, the chief magistrate of the Baram district of the Raj of Sarawak. Mr. Hose, who is a Cambridge man (Jesus College), is a keen naturalist, and has a wide knowledge of and sympathy with the natives, and has promised exceptional facilities for seeing something of the inland tribes of Borneo. Besides the ordinary instruments for anthropometry, there will be a small carefully selected collection of apparatus for experimental psychology, among which the following may be noted: a sphygmometer for recording alterations in the pulse, Cattell's algometer for testing pain, and an aesthesiometer. Various appliances will be employed for testing acuity of vision and colour-blindness, and an apparatus for quantitatively studying visual illusions has been provided. Acuity of hearing will be tested by Politzer's Ohrmesser, and the range by Galton's whistles. A complete equipment has been taken out for recording reaction time, including tuning-forks, time-markers, drums, and visual and auditory signals. Several cameras will be employed in photographic work, and an attempt will be made to record natural colours by the Ives and Joly processes. A Newman and Guardia cinematograph for recording native dances and actions has been provided. The languages and music will be perpetuated on numerous phonograph cylinders.

Proposed Bibliography of Australasia.—Mr. E. A. Petherick, the well-known compiler of 'The York Gate Catalogue,' has for the last thirty years been engaged in collecting the material for an exhaustive catalogue of the literature

relating to Australasia and Polynesia, published since 1600 in every language. The titles already obtained exceed 30,000 in number, and their arrangement in the double form of an author's and classified catalogue would fill an imperial octavo volume of 900 or 1000 pages in double column. The expense of such a work will necessarily be considerable, even bearing in mind that the compilation is already completed, and as the work is one of national rather than public importance, the difficulty of securing publication is serious. The Australasian colonies are not yet sufficiently united, nor perhaps sufficiently cultured, to undertake the publication of a work which, if lost, will shroud in obscurity a mine of literary wealth, for which, when too late, they would consider no price to have been too great. Mr. Petherick has resolved to publish the work at once at his own risk, if a sufficient number of copies are subscribed for at £3 10s. each, to cover the cost of production. Application may be made direct to Mr. Petherick, at 3, York Gate, London, N.W., or to any of the leading bibliographical booksellers. While all aspects of every part of Australasia and Polynesia are dealt with in the work, its value to geographers is, perhaps, greater than to other specialists. The importance of having the whole record of discovery and settlement of so extensive an area brought together is so great, that it only requires to be pointed out to be generally recognized.

Water-supply of Queensland.—We have received the report of the hydraulic engineer of Queensland for the year 1896. To the report itself, which contains much information of geological and meteorological interest, there are added tables showing position, depth, and yield of a large number of artesian borings, some analyses of deep waters, and a map exhibiting the results of rainfall observations in an unusually effective way. Generally speaking, the artesian wells of Queensland obtain their supplies from porous sandstones and other permeable beds of the Lower Cretaceous or Rolling Downs formation. The Lower Cretaceous rocks extend westward from the Palaeozoic coastal range, and, so far as at present known, stretch over some 374,358 square miles, including 56 per cent. of the whole area of Queensland. They occupy by far the greater part of Western Queensland, and extend over South Australia, entering Western Australia and New South Wales, and marking the position of the ancient Cretaceous sea which connected the Gulf of Carpentaria with the Great Australian Bight. From the borings already made, it appears that more or less satisfactory artesian water-supply exists in at least 106,000 square miles of the Queensland area. There remain about 132,000 square miles in the south-western districts still unexplored by the drill, and it is suggested that a few trial borings should be made at the expense of the State; there seems little doubt that they would be successful, and their success would give great impetus to the development of that part of the colony. The report further deals with the distribution of the artesian water-supply by irrigation, and with improved arrangements for giving warning of floods in the Brisbane, Mary, Fitzroy, and other rivers.

Currents of the Australian Coasts.—Mr. H. C. Russell recently communicated to the Royal Society of New South Wales a second list of floats or bottles picked up at various points of the Australian coast, with notes as to their probable course and rate of movement. In the small number of cases where there are opportunities of comparing this method of studying the movements of the surface layers of water in the ocean with the more delicate methods involving observations of temperature and salinity, it must be confessed that, while on the whole much better than nothing, the results are frequently very misleading. That these new observations are no exception to this rule is evident from the following: "In the present list . . . we have fifteen papers found on the east coast; three of them went to the south, eight went to the north, and four came in from the east. In view of the well-known southerly current on this coast, it is remarkable that so few of

the papers found seem to go with it, and that the majority of the papers found go against the current." The most interesting cases are those of the bottles found on the coast between Melbourne and Adelaide, which include three thrown into the sea near Cape Horn. Mr. Russell suggests that the bottles are carried east by the current, and at the same time urged northward by the south-west and southerly winds, giving a resultant direction about east-north-east, which would land them on the coast. It would seem that, if we accept this suggestion and the facts just mentioned about bottles landing on the east coast, we must be driven to regard the whole method of observation as worthless. It may, however, be possible that the true interpretation is that given by M. Hautreux to his observations in the Bay of Biacay—that the current really sets to the shore with the wind, and that the water is merely banked up against the land. The doctrine that upwelling of water is caused by off-shore winds is now universally accepted, and it is difficult to see why the contrary effect of winds from the sea is so rarely admitted.

POLAR REGIONS.

Prof. Copeland's Revision of Payer's Map of Franz Josef Land.—

Petermanns Mitteilungen for September, 1897, contains a notice from the pen of Dr. Supan of Prof. Copeland's revision of Payer's map of Franz Josef Land, published in the *Journal*. After again expressing his regret that Payer allowed his observations to be worked up and published without carefully revising them himself, Dr. Supan draws attention to some of the changes introduced by Prof. Copeland, and points out difficulties in reconciling some of them with statements recorded in Payer's own journal. For example, Payer says, "Wir waren längs der Andrée-Insel nach Süd hinabmarschiert, hatten das flache Eisgewölbe der Rainer-Insel überquert und sahen nach West die mit vielen Eisbergen erfüllte Back-Einfahrt." Andrée island is absent from Copeland's map, being merged in Karl Alexander Land, "there being no certain traces of a strait in the survey." Dr. Supan believes the riddle of Payer's Wilczek Land to be still unsolved, and protests against the reappearance of the Dove glacier in Lindemann bay. The arguments for the retention of Richthofen peak leave him unconvinced, and he points out difficulties in reconciling Prof. Copeland's statements on pp. 180 and 186 of his paper with reference to its position and height.

German Antarctic Expeditions.—As the result of a meeting of the German committee for the furtherance of south polar research, which was held in Leipzig on February 19 under the presidency of Dr. G. Neumayer, a plan has been formulated for the proposed expedition, of which Dr. E. von Drygalski has been chosen leader. The following is an outline of the scheme. A ship will take the expedition into the south polar region, and a suitable spot will be chosen for wintering. During the winter scientific observations will be carried out at the station, and in the spring an attempt will be made to advance with sledges over the continuous polar ice in the direction of the pole. In the autumn of the southern hemisphere, it is proposed to follow the coast-lines of the southern lands in the direction of the magnetic pole, and, if possible, to explore the west side of Victoria Land, the return being made thence through the pack-ice. For the advance southwards, the meridian of Kerguelen's Land is recommended for the following reasons: (1) A serious attempt has never been made on that meridian; (2) its position in regard to the observatories of Melbourne and Mauritius renders it particularly favourable for magnetic work; (3) by this route the oceanographical researches of the *Gaselle*, and those to be carried out by the deep-sea expedition under Prof. Chun, can be extended; (4) the breaking up of the ice lately observed near Kerguelen's Land promises favourable conditions during the next few years.

A complete programme for extensive scientific observations throughout the whole voyage has been drawn up. It is proposed that the expedition should start in August, 1900, while June of 1902 is suggested as the date of the return. The *personnel* would consist of twenty-five, viz. five scientists, five officers and engineers, and a crew of fifteen. It is also proposed to equip a German Government expedition to the Antarctic, mainly for deep-sea research.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Suess' 'Das Antlitz der Erde' in French.—The first volume of Suess' great work on Geomorphology was published in 1885, and at once took the leading place as the greatest contribution ever offered by geology to geography. M. de Margerie has now brought out a French edition, for the work is much more than a translation, under the title 'La Face de la Terre.'* It includes the whole of the original first volume, dealing with the movements of the crust of the Earth, and mountains, the latter heading including the origin of oceanic depressions and of continents. The new French edition is one-third longer than the original German, even allowing for the greater compactness of the German language. A considerable part of this increase is due to seventy-six new illustrations, considerably more than doubling the original number; but more must be placed to the credit of editorial notes, supplying fresh illustrative material and greatly extending the already copious bibliographies. The translation is the work of several hands, and each section bears the name of its translator. Besides M. de Margerie himself, the list of translators includes the well-known names of MM. Depéret, Gallois, Haug, Kilian, Marillier, Michel-Lévy, Raveneau, and Schirmer. They have been careful to distinguish their own notes and additions from the original matter of the classic. In his preface M. Bertrand ingeniously shows how the labours of Leopold von Buch and Elie de Beaumont, discredited as they both were by their mechanical and unbending theories, yet formed stages in the progress of the science of the Earth's crust, naturally leading to the dominant generalizations of Suess. He dwells strongly on the value of translating a book which has proved so full of suggestion as well as of instruction to all men of science who have read it in its original form, and looks for a great increase in its usefulness now that it has been so successfully made accessible to readers of the French language. It is a long-standing grievance that all the best modern geographical works exist only in foreign languages, and that English-speaking students, as a rule, cannot read them with the ease necessary for full appreciation. Why books of this class should find no market in English-speaking countries (with a population equal to that of all French and German-speaking countries put together) promising enough to tempt publishers to bring out translations by competent men, is a mystery which is not difficult to penetrate. The long-continued neglect of geography in the universities of Great Britain and America is directly responsible; but the awakening on the other side of the Atlantic has begun, and it would cause but little surprise if an English edition of Suess were produced in the United States. We can wish, though we can hardly hope, that this great work, and such other standard handbooks as the volumes of Ratzel's series, may one day be rendered freely available by publishers in this country. M. Bertrand concludes his eloquent preface with the words, "The creation of a science, like that of a world, requires more than one day; but when our successors write the history of our science, I am persuaded that they will record the work of Suess as marking the end of its first day, that in which light was created."

* 'La Face de la Terre' ('Das Antlitz der Erde'), par Ed. Suess. Traduit avec l'autorisation de l'auteur et annoté sur la direction de Emmanuel de Margerie avec une préface par Marcel Bertrand. Tome 1^{er}. Paris: Armand Colin et Cie.

A New Theory of Old Glaciers.—Prof. de Lapparent, in the *Revue des Questions Scientifiques* for October, 1897, criticizes the new theory of the history of the Swiss glaciers put forward by Prof. Stanislas Meunier in the *Revue Scientifique* for February, 1897. M. Meunier holds that there is no evidence for alpine glaciers having been previously longer or more powerful than they now are. He accounts for moraines of ancient date occurring at a long distance from the present mountain slopes by the hypothesis of glacial retrogression. He pictures the Alps as formerly consisting of a great Pamir-like plateau of great extent, the outer escarpments of which nourished glaciers similar in size to those of the present day. The glaciers of the Pamirian phase worked back like rivers by expediting the erosion of the cirques at their head, and so in time greatly narrowed the mountain belt, and retired from their early moraines. Keeping pace with the erosion, the glaciers, preserving approximately their original length, crept back from north and south towards the present central line of the Alps, leaving their moraines as a measure of their erosion. Thus the *Alpine phase* was reached. Later, the eating back reduces the height of the central line, and a *Pyrenean phase* is produced, leading still later to a *Vosgean phase*, when, the summits being worn away below the snow-line, glaciers become impossible. Prof. de Lapparent goes fully into the arguments for this hypothesis, and finds them insufficient to justify the abandonment of the earlier theory of a former great extension of alpine glaciers coincident in its period of maximum extent, and in its variations, with the movements of the North European ice-sheets as shown by the distribution of glacial drift and erratic blocks. M. Meunier explains the distribution of erratics in the neighbourhood of the Alps by the "capture" of one glacier by another, the head of which has eaten back through the dividing wall, and thus tapped the ice-supply. This hypothesis M. de Lapparent finds to be contradictory to the laws of glaciers and of ice-movement, and he prefers to look to the ice-sheet of Greenland for an explanation of existing conditions rather than to the hypothetical Pamir-like plateau. Further, he shows, by reference to the map of the Pamirs published with Mr. Curzon's paper in this *Journal* (vol. viii. p. 96), that the Pamirs do not actually form a lofty ice-free plateau surrounded on its outer slopes by a glacial halo, but form, on the contrary, a region of high valleys and lofty mountains, the glaciers of which rather tend to flow from the lofty ranges towards the great valleys of the centre, than to radiate outwards.

Earth-pillars and Pyramids.—The third number of the *Münchener Geographische Studien*, edited by Prof. Siegmund Günther, consists of a paper by Dr. Christian Kittler on earth-pillars and similar structures. Their distribution is discussed at length; they occur in different forms in more or less restricted regions of the Alps, the Carpathians, and the Pyrenees in Europe; in many parts of North and South America; in the Congo basin, the Transvaal, Zanzibar, and Teneriffe in Africa; in Asia Minor, the Himalayas, and the Malay archipelago in Asia; and in Spitsbergen. Dr. Kittler points out, however, that small temporary earth-pyramids, formed as the result of sudden melting of snow, heavy showers, or sudden squalls of wind, are to be regarded as precisely similar phenomena in a rudimentary stage. The formation is apparently due in all cases to a similar cause—rapid vertical erosion of soft fragmentary or diluvial deposits—and they accordingly reach their greatest development on steep slopes cut into by torrential streams, and exposed to sudden excessively heavy rains. The consistency of material required for the formation of true pillars is best obtained in moraine detritus, next best in trachytic tuffs and laterites, and almost as well in marls and conglomerates. Dust-laden winds, frost, and strong insolation are important factors in producing earth-pillars, but these agents rank far behind torrential

downpours of rain. The action of a swift stream round the base of the columns is important in maintaining the steep angle of the sides, as it prevents accumulation. It is to be noticed that the crowning-stone at the top of the pillar is not an essential feature; the pillars are due to differences in the texture of the fragmentary mass.

GENERAL.

Geography in Education.—The report presented at the Toronto meeting of the British Association by the committee appointed in 1895 to inquire into the position of geography in the educational system of the county, has since been issued as a pamphlet. It has been prepared by Mr. A. J. Herbertson, secretary of the committee. Although unable to undertake a personal inspection of various educational institutions at home and abroad, the committee have been in correspondence with numerous authorities on the subject, whose information, combined with the individual experiences of the members, has enabled a clear view to be presented of the present position of geography, and the measures most urgently required to place the subject on a more satisfactory footing. In the elementary schools, while the syllabuses require some modification, the great desideratum is the proper training of teachers and the adoption of a loftier educational ideal in connection with the subject. Some improvement has been noted of late, and topography is often sufficiently taught, but a knowledge of geographical *principles* is too often lacking, the physical aspects of the subject being in particular imperfectly dealt with. In the secondary, including the public, schools no organization exists, and the treatment of geography varies according to the fancy and inclination of the head master—one professing no interest in the subject, while another founds all his teaching on it. In Scotland a somewhat better organization prevails than in England. An improvement in the position and quality of geography in public examinations would probably do something to ameliorate the present state of things; but here again the great need is the provision of proper training for teachers in modern geographical ideas and methods. This, of course, depends chiefly on the universities, only two of which at present recognize geography as an optional subject for the ordinary degree, whilst the only other recent advance towards improving the position of the subject has been made at Cambridge by its inclusion as a compulsory subject for the Historical Tripos. The report insists that “in our universities geography should have its due place, equivalent to that of any other university subject now fully recognized;” and that “the university should provide the skilled teaching and efficient equipment that are necessary for a subject regarded as of first-rate importance by nearly every first-class university outside the English-speaking lands.” Some useful statistics, illustrative of the present position of the subject both at home and abroad, are given in appendices.

Geography in German Schools.—The Education Department has recently issued the first of a series of volumes entitled “Special Reports on Educational Subjects,” compiled by Mr. M. E. Sadler. It contains reports from a number of experts on the present condition of the theory and practice of education in this country and abroad. One of these, by Mr. George Wheelton, deals with the teaching of geography in the elementary schools of Saxe Weimar. There the instruction takes place in three standards; the first is *Anschauung* (object-lessons or demonstrations), conducted for the most part out-of-doors, and adjusted in subject to the season of the year. The objects are twofold: (1) to train the pupil to quick and comprehensive observation, and (2) to afford facility in the clear and definite description of what is seen. This leads to the fascinating system of school excursions, in which the teacher conducts his class into the country, or in towns to museums, workshops, etc., calling their attention to objects of interest, and

explaining the meaning and relations of each. The excursions are made longer, and the descriptions, afterwards written by the pupils, more exacting as the second standard or *Heimatskunde* (local geography) is reached. Thus the use of maps is thoroughly and practically taught, the local fauna and flora is intimately and correctly known, and the geography of the country for many miles around the school is fixed for ever in the mind. The last standard or *Erdkunde* (geography of the globe) finds the pupil prepared to study maps as symbols of real things, and to construct easily and naturally mental pictures of distant lands, such as can never be attained in any other way. All through, geography is taught in connection with other subjects, and especially with history. Several specimen excursions in the neighbourhood of Weimar are explained in detail in the Report. In the same volume Miss Dodd gives an account of "The School Journey in Germany," in which she traces the growth of the practice of educational travel for children from the time of Rousseau, who appears to have first given effect to it, until the present time. The school journey is now a firmly established institution in Germany; and while, in fact, the vehicle of by far the most valuable educational training, it takes the form of an organized holiday, the element of taskwork being subordinated, and the discipline rendered no more irksome than the rules of a game. A description is given of two school journeys in detail, the first a three-days' walking tour, the second a six-days' excursion, partly by rail and partly on foot. The expense in the latter case amounted only to 15s. per boy, the railways granting specially low rates, the food being of the simplest kind, and the boys sleeping, as a rule, on straw in a large empty room in a village inn or farm. The journey is planned long beforehand; the boys selected to take part in it are told what they are going to see and the chief facts as to each place, and each boy draws a map of the district, showing the proposed route. An outfit is prescribed, and two days before the journey the boys are paraded, their knapsacks inspected, and their physical fitness ascertained. The departure takes place in the presence of the assembled parents and the envious fellow-scholars, who were not considered advanced enough to join. The day's journey is carefully arranged with occasional halts, and the march is cheered by much singing. All sorts of natural objects are collected and described; every crop in the fields is examined, and every industry met with explained. The salient facts of history, relative to the towns or battlefields visited, are recalled in view of the places themselves, and special attention is given to diversities of local custom or costume. In the longer excursion from Jena to the Rhön mountains in Bavaria, the Protestant children from Thuringia were taken to hear the Roman Catholic Church service for the first time, and the religious differences were explained with reference to the history of the states of Germany, which again would furnish an opportunity for explaining the constitution of the German empire.

Death of Ramon Lista, Argentine Explorer.—This explorer, author of *Viaje á los Andes Australes* (Buenos Aires, 1896), has met with a violent death while on a journey of exploration to the upper Pilcomayo. He wrote to *La Nacion* (a Buenos Aires newspaper) from Oran (Salta) on November 18, 1897, announcing his intention of making this journey. Early in December his two companions returned to Oran, saying that Lista had perished from thirst and the hardships of the journey in the forests near Miraflores in the Chaco. Search was made for his body, and when it was found his money, his watch, and his baggage were missing. His two companions, an Italian and an Argentine labourer, are now in prison on suspicion of having murdered him. Dr. Lista was an Honorary Corresponding Member of the Society.

Death of M. Bouthillier de Beaumont.—We regret to record the death of M. H. Bouthillier de Beaumont, Hon. President of the Geographical Society of

Geneva, which took place on February 4 last. The Geneva Society may be said to have almost entirely owed its success to M. de Beaumont, to whose initiative its foundation in 1858 was due, and who presided over its labours without intermission from that year until 1884. M. de Beaumont had reached the age of seventy-nine years.

Establishment of an "Urania" in Vienna.—We learn that an "Urania," that is to say, an institution in which all the most interesting features of the various branches of science and technology will be exhibited to the public in a systematic manner, has lately been founded in Vienna. The central idea of the undertaking will be the graphic and concrete representation of scientific facts, such as is the custom at the Berlin Urania. The preliminary arrangements were carried out towards the end of last year, by a committee of well-known scientists, in conjunction with a syndicate of industrial representatives. About twenty separate groups have been formed, each under its own president. That for geography and geology is to be presided over by Major-General von Steeb, director of the Military Geographical Institute. The allied sciences are represented by groups for astronomy, meteorology, geology, and anthropology.

OBITUARY.

Captain Roberto Ivens.

WE regret to record the death, on January 28, of Captain Ivens, the distinguished African explorer. Roberto Ivens was the descendant of a Russian family (Ivan, Ivans, Ivens), resident for some time in Wales, then in the Azores and Portugal. His mother was a Portuguese. He was born in St. Michael's island on June 12, 1850. In 1867 he entered the Portuguese Royal Navy, travelling in Asia, Africa, North and South America. From 1876 to 1877, Lieut. Ivens surveyed some points of the western coast of Africa, from the Great Fish bay to the mouth of the Zaire-Congo, and up to Noki.

In 1877, while preparing with H. Capello and Serpa Pinto, at São Paulo de Loanda, their first great journey, they had for some time, as their guest, H. M. Stanley, just returned from his discovery of the central part of the Lualaba-Congo. Capello and Ivens started in October from Benguella to the African highlands, studied the region whence the waters run to the Cunene, the Kubango, the Kwandc-Lungui-Bungo-Zambeze, the Kwanza, the Kassai, and the Kwango, which latter they followed and mapped up to the 5th parallel of south latitude (June, 1879).*

In 1884 (April), Captains Capello and Ivens started again from Pinda on the Atlantic (south of Mossamedes), explored the Koroka, the Kunene; crossed the Kubango, the Kuito, the Kwando, in 16° 15' S. lat., the Barotse valley; followed the Liambai-Kabompo; explored the high affluents of the Lualaba, Lufira, and Luapula; visited the Garanganza; studied the country between the Bangweolo-Luapula and the Luangwe-Kafukwe, reached the Zambezi at Shoa, and followed it to the Indian ocean (June, 1885, 4500 geographical miles).†

During their travels, Captains Capello and Ivens determined astronomically numerous places, made daily meteorological and magnetic observations, and brought

* 'From Benguella to the Territory of Jacca.' 2 vols. London: 1882. Translated from the Portuguese (Lisbon: 1881).

† 'De Angola a' Contra Costa. Descrição de uma viagem através do Continente Africano.' 2 vols. Lisboa: 1886. This work was never translated.

to Europe large collections of the representatives of African petrology, flora, and fauna (now mostly at the Lisbon Museum of Natural History). Their scientific services were acknowledged with many honorary testimonials by the governments and geographical institutions of Portugal, Spain, France, Italy, and Germany. Captain Ivens was aide-de-camp of the King of Portugal.

Of the two travellers, Captain Ivens, although the younger, suffered the most from malarious fevers and scurvy, and never entirely recovered his previous health.

**MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY,
SESSION 1897-1898.**

Eighth Ordinary Meeting, February 28, 1898.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

ELECTIONS.—*Captain E. B. Burton (17th Bengal Cavalry); Joseph Margerison Butler; Thomas Arthur Chalk; Thomas Davies; Lieut. Francis Dixon-Johnson (6th Inniskilling Dragoons); Edward Langworthy; Lieut. Ernest Theodore Marshall (East Yorkshire Regiment); John Mathias (Commander s.s. "Ness"); V. C. H. Millard, M.A.; Rev. Joseph Henry Gybbon Spilisbury, M.A., Ph.D.; Lieut. Jas. Stevenson-Hamilton (6th Inniskilling Dragoons); William Montagu Sweet; Commander Leicester Gartside Tippinge, R.N.; Hamilton Willis.*

The Paper read was :—

"The Annual Range of Temperature in the Surface Waters of the Ocean, and its Bearing on Oceanographical Problems." By Dr. John Murray, F.R.S.

Ninth Ordinary Meeting, March 14, 1898.—General Sir CHARLES W. WILSON, R.E., K.C.B., K.C.M.G., Vice-President, in the Chair.

ELECTIONS.—*Dr. José Bach; Thomas William Bushill; Captain Herbert Lane Goodenough (Indian Staff Corps); Samuel Henry Harrison; Dr. Bendalach Hewatson, M.R.C.S., F.L.S., F.Z.S.; Edward Holden; Lieut. G. von Essen Moberley (11th Hussars); Roderick F. Murchison; Alfred John Pease; Arthur E. L. Ringrose; Joseph George Robins; Sir Albert Rollit, M.P.; Alexander Horsburgh Turnbull; Coulson Turnbull, D.Ph.; Hon. William Warren Vernon; Captain Herbert Flamstead Walters (Indian Staff Corps).*

The Paper read was :—

"Exploration in Spitsbergen, 1897." By Sir W. Martin Conway.

Afternoon Technical Meeting, Wednesday, March 16, at 4.30 p.m.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

The Paper read was :—

"On Sea-beaches and Sandbanks." By Vaughan Cornish, M.Sc., F.C.S.

GEOGRAPHICAL LITERATURE OF THE MONTH.

*Additions to the Library.*By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.	Mag. = Magazine.
Ann. = Annals, Annales, Annalen.	P. = Proceedings.
B. = Bulletin, Bollettino, Boletim.	R. = Royal.
Com. = Commerce, Commercial.	Rev. = Review, Revue, Revista.
C. Ed. = Comptes Rendus.	S. = Society, Société, Selskab.
Erdk. = Erdkunde.	Sitzb. = Sitzungsbericht.
G. = Geography, Geographie, Geografia.	T. = Transactions.
Gea. = Gesellschaft.	V. = Verein.
I. = Institute, Institution.	Verh. = Verhandlungen.
Is. = Ivestiya.	W. = Wissenschaft, and compounds.
J. = Journal.	Z. = Zeitschrift.
M. = Mitteilungen.	Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria—Bohemia.

Audiatur et altera pars! Ein Beitrag zur deutsch-böhmischen Streitfrage. Von P. S. Prag, 1898. Size 9 × 6, pp. 16. *Presented by the Author.*

On the unwisdom of endeavouring to secure the exclusive use of the German language in Austria.

Austria—Lake Hallstatt. *M.k.k.G. Ges. Wien* 41 (1898): 1-218.

Liburnau.

Der Hallstätter See. Eine limnologische Studie von Dr. Josef Ritter Lorenz von Liburnau. *With Map.*

This will be noticed along with other limnological works.

Austria-Hungary.

Monumenta Hungariæ Historica. Magyar Történelmi Emlékek. Második Osztály. Irók. XXXV. Kötet. Budapest, 1896. Size 9½ × 6½, pp. xiv. and 632. Első Osztály. Okmánytárak. XXVIII. Kötet. Budapest, 1897. Size 9½ × 6½, pp. ccxiv. and 598. *Map.*

Austria-Hungary. *Deutsche Rundschau* G. 20 (1898): 158-164.

Becker.

Das Sövärgebirge und das Bad Rank-Herlein. Von Dr. Anton Becker.

The Sövar mountains are in the north of Hungary, near the town of Kaschau.

Black Sea and Sea of Azoff—Lighthouses.

Description of Lighthouses, Beacons, and Landmarks of the Russian Empire along the Coasts of the Black Sea and Sea of Azoff. Published by the Hydrographical Department, Ministry of Marine. St. Petersburg, 1897. Size 6 × 9, p. 163. [In Russian.] *Presented by the Russian Hydrographic Department.*

Bulgaria. *Riv. G. Italiana* 4 (1897): 397-402.

Garnier.

La nomenclatura orografica della Bulgaria. Del Signor Christian Garnier. *With Map.*

Denmark—Meteorology.

Annuaire météorologique pour l'année 1893, publié par l'Institut Météorologique de Danemark. Deuxième Partie (pp. 90). Ditto pour l'année, 1896. Troisième Partie. Kjöbenhavn, 1897. Size 14 × 9½, pp. xxii. and 72. *Maps and Diagrams.*

Europe—Climate. *Ann. Hydrographie* 25 (1897): 442-458.

Bebber.

Die Hauptwetterlagen in Europa. Von Prof. Dr. W. J. van Bebber. *With Diagrams.*

Europe—Historical. *Mém. couronnés A.R. Belgique* 54 (1896): 1-368.

Lonchay.

La rivalité de la France et de l'Espagne aux Pays-Bas (1635-1700). Étude d'histoire diplomatique et militaire. Par Henri Lonchay.

- Europe—Jura.** *Rev. Scientifique* 8 (1897): 717-722. **Reverchon.**
La montre dans le Jura. Par M. L. Reverchon.
On the watch-making industry of the Jura, which is credited with turning out two-thirds of all the watches made in the world. Both the French and Swiss watch-making centres are described, and a map of their distribution is given.
- France and Switzerland—Speleology.** *C. Rd. S.G. Paris* (1897): 416-421. **Martel.**
Résumé de la 10^e campagne souterraine (1897) de M. E.-A. Martel en France et en Suisse.
- France—Corsica.** *B.S.G. Marseille* 21 (1897): 265-276. **Nuttinger.**
Excursions en Corse: l'Étang de Biguglia. Par M. F. Nuttinger.
- France—Dauphiné and Savoy.** **Joanne.**
Collection des Guides-Joanne. Guides-Diamant. Dauphiné et Savoie. Par P. Joanne. 6 Maps, 6 Plans, 1 Panorama. Paris: Hachette et Cie., 1897. Size 6 x 3½, pp. xxxii. and 524.
- France—Gard.** *C. Rd.* 126 (1898): 290-293. **Martel and Viré.**
Sur les avens de Sauve (Gard) et la forme des réservoirs des sources en terrains calcaires. Note de MM. E. A. Martel et A. Viré. *With Plans.*
- France—Lakes.** **Delebecque.**
Les lacs français. Par André Delebecque. Paris: Typ. Chamerot et Renouard, 1898. Size 12½ x 9, pp. xii. and 436. *Maps and Illustrations. Presented by the Author.*
This beautifully executed work will be specially noticed.
- France—Lakes.** *Globus* 73 (1898): 43-46. **Halbfass.**
Die Seenforschung in Frankreich. Von Dr. Halbfass.
Notice of M. Delebecque's great work on French lakes.
- France—La Rochefoucauld.** *B.S.G. Rochefort* 19 (1897): 145-169. **Fermond.**
Quelques annales de la ville de La Rochefoucauld. Par M. J. Fermond.
Notes on the growth and changes of La Rochefoucauld from 1019 to 1887.
- France—Lozère.** **Martel and Viré.**
Sur l'aven Armand (Lozère) (profondeur 207^m). Par MM. E.-A. Martel et A. Viré. Paris: Gauthier-Villars et Fils, 1897. Size 11 x 9, pp. 4. *Plan. Presented by the Authors.*
- France—Normandy.** **Joanne.**
Collection des Guides-Joanne. Itinéraire général de la France. Par Paul Joanne. Normandie. 7 Maps and 22 Plans. Paris: Hachette et Cie., 1897. Size 6½ x 4½, pp. 74, xxxviii. and 424.
- France—Population.** *Rev. Scientifique* 8 (1897): 796-797. **Dumont.**
La dépopulation dans l'Orne. Par M. A. Dumont.
A statement of the decline of population in a commune of Calvados and other parts of France.
- France—Provence.** *Ann. G.* 6 (1897): 212-229; 7 (1898): 14-33. **Bertrand.**
La basse Provence. Par M. Marcel Bertrand. *Maps.*
This fine piece of regional geography will be specially noticed.
- France—Pyrenees.** *B.S.G. de l'Est* (1897): 209-236. **Guénot.**
Des effets du déboisement dans les Pyrénées. Par M. Guénot.
This paper has already been published in the *B.S.G. de Toulouse.*
- France—Southern.** *B.S.G. Commerc. Bordeaux* 20 (1897): 405-423. **Bayle.**
La Double. Étude de géographie régionale. Par Émile Bayle.
La Double is a region north of the estuary of the Gironde.
- Germany.** *P.R. Artillery* 1. 24 (1897): 445-456. **Bigelow.**
A Cruising Visit to some German Battle-fields. By Poultney Bigelow.
A canoe voyage down the Moldau and Elbe.
- Germany.** *Nineteenth Century* 43 (1898): 182-191. **Birchough.**
The Expansion of Germany. By Henry Birchough.
- Germany.** *B. Geolog. I. University of Upsala* 3 (1896): 27-114. **Munthe.**
Studien über ältere Quartärlagerungen im südbaltischen Gebiete. Von Dr. Henr. Munthe.
On the quaternary formations on the southern shore of the Baltic.

- Germany—Anhalt.** *M. Ver. Erdk. Halle* (1897): 64-74. **Früchtenicht.**
Die Volksdichte im Herzogtum Anhalt nach der Volkszählung vom 2. Dezember 1895 (nebst Karte). Von H. Früchtenicht.
- Germany—Bavaria.** *G.Z. 3* (1897): 545-557. **Ula.**
Der Starnberger See. Von Dr. Willi Ule.
On the depths and temperature of the Starnberg lake.
- Germany—Eisleben.** *Naturw. Wochenschrift* 12 (1897): 409-415, 421-429. **Lang.**
Von Vulcanismus und Oberflächengliederung unabhängige Bewegungen und Erschütterungen des Erdbodens. Von Otto Lang.
On seismic movements, illustrated by the case of Eisleben.
- Germany—Geodesy.**
Jahresbericht des Direktors des Königlichen Geodätischen Instituts für die Zeit von April 1896 bis April 1897. Potsdam, 1897. Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. 28.
- Germany—Harz.** **Eschenhagen.**
Forschungen zur deutschen Landes- und Volkskunde . . . herausgegeben von Dr. A. Kirchhoff. Elfter Band, Heft 1. Magnetische Untersuchungen im Harz. Von Prof. Dr. M. Eschenhagen. Stuttgart: J. Engelhorn, 1898. Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. 20. *Plates.*
The magnetic constants of a number of stations in the Harz district are given in tables, and summarized in a map and sections.
- Germany—Kyffhäuser.** *M. V. Erdk. Halle* (1897): 54-64. **Grössler.**
Noch einmal über Kyffhäuser und Wodansberg auf Grund einer Darstellung der Besitzverhältnisse der Klöster Walkenried und Sittichenbach an der unteren Helme. Von Prof. Dr. H. Grössler.
- Germany—Merchant Ships.** *Ann. Hydrographie* 25 (1897): 475-482. **Meyer.**
Das Verhältnis der Dampfschiffahrt zur Segelschiffahrt. Nach der Statistik des Deutschen Reiches bearbeitet von Kapl. H. Meyer.
A statistical study of the number of sailing ships and steamers owned in Germany, and of those visiting German ports at five-year intervals from 1875.
- Germany—Meteorology.**
Veröffentlichungen des Königlich Preussischen Meteorologischen Instituts. Herausgegeben durch dessen Direktor Wilhelm von Bezold. 1897. Heft 1. Ergebnisse der Beobachtungen an den Stationen II. und III. Ordnung im Jahre 1897; zugleich Deutsches Meteorologisches Jahrbuch für 1897. Berlin: A. Asher & Co., 1897. Size 13×10 , pp. 56.
- Germany—Prussia.** *M. V. Erdk. Halle* (1897): 74-91. **Reischel.**
Die Wüstung Sömmeringen bei Pabstorf im Kreise Oecherleben und die Wüstung Sömmeringe a. d. Elbe bei Wolmirstedt. Von Dr. G. Reischel.
A discussion as to which place corresponds to the *Sumeringe* frequently referred to in the Middle Ages.
- Germany—Prussia—Climate.**
Veröffentlichungen des Königlich Preussischen Meteorologischen Instituts. Ergebnisse der Gewitter-Beobachtungen in den Jahren 1892, 1893, 1894. Berlin: A. Asher & Co., 1897. Size $13\frac{1}{2} \times 10\frac{1}{2}$, pp. xxxii. and 58.
The electrical phenomena of the atmosphere as observed at the meteorological stations of the German empire are here tabulated and discussed. The stations are grouped in squares of 1° of longitude and $30'$ of latitude, so as to give means for the whole empire.
- Germany—Shipping.** *G.Z. 4* (1898): 1-16, 78-91. **Lindeman.**
Die deutsche Seehandelschiffahrt. Von Dr. Moritz Lindeman.
- Germany—Thuringia.** *M.G. Ges. Jena* 16 (1898): 59-85. **Gerbing.**
Begleitworte zur Gewässerkarte von Südwestthüringen. Von L. Gerbing. *Witt. Map.*
The map gives simply the courses and names of rivers, while the text supplies notes, historical and physical.
- Greece.** *Z. Ges. Erdk. Berlin* 32 (1897): 343-348. **Philippson.**
Dr. A. Philippson's barometrische Höhenmessungen auf den griechischen Inseln des Ägäischen Meeres. Berechnet von Dr. A. Galle.

- Greece.** *Z. Ges. Erdk. Berlin* 32 (1897): 244-302. **Philippson.**
Reisen und Forschungen in Nord-Griechenland. Von Dr. Alfred Philippson.
This is the completion of Dr. Philippson's important memoir on Northern Greece.
- Greece—Kythnos.** *B.S.R. Bolge G. 21* (1897): 417-447. **Hautteœur.**
L'île de Kythnos (Thermis). Par H. Hautteœur.
- Holland.** **Lorié.**
Mededeelingen omtrent de Geologie van Nederland, verzameld door de Commissie voor het Geologisch Onderzoek. No. 22. I. De Sluisput bij Neder-Andel in de Afdamming der Maas; II. De Grondboringen om Wageningen; III. De Grondboringen te Winterswijk; IV. De Grondboringen bij Weesp; V. De Grondboringen langs het Merwedekanaal. Door Dr. J. Lorié. Verhandelingen der K. Akademie van Wetenschappen te Amsterdam (Tweede Sectie). Deel v. No. 9. Amsterdam: J. Müller, 1897. Size $10\frac{1}{2} \times 7\frac{1}{2}$, pp. 30. *Plates.*
- Holland.** **Schroeder Van der Kolk.**
Mededeelingen omtrent de Geologie van Nederland, verzameld door de Commissie voor het Geologisch Onderzoek. No. 21. Bijdrage tot de Karteerling onzer Zandgronden (II.). Door J. L. C. Schroeder Van der Kolk. Verhandelingen der K. Akademie van Wetenschappen te Amsterdam (Tweede Sectie). Deel v. No. 7. Amsterdam: J. Müller, 1897. Size $10\frac{1}{2} \times 7\frac{1}{2}$, pp. 58. *Plates.*
- Holland.** *Tijds. K. Ned. Aard. Genoots. Amsterdam* 14 (1897): 673-694. **Beekman.**
Aanwinst en verlies van gronden in Zeeland in de laatste 10 jaren. Door A. A. Beekman. *With Map.*
On the gain and loss of land during the last ten years in the province of Zeeland.
- Holland—Coasts.** *Engineering Mag.* 14 (1897): 402-410. **Corthell.**
The Protection of Shores against Encroachments of the Sea. By E. L. Corthell. *With Map and Plans.*
A sketch of the works by which the Dutch engineers have combated the encroachments of the sea.
- Iceland.** *Norske G.S. Aarboeg* 8, 1896-97 (1897): 22-36. **Thoroddson.**
Dr. Th. Thoroddson: Islandske forhold i nutiden.
On the economic resources of Iceland.
- Italy.** *J.R. United Service I.* 41 (1897): 1395-1413. **Needham.**
Between the Chiasee and Adige. Translated from the *Rivista Militare Italiana* of September 1st, 1897, by Colonel C. Needham.
Some particulars of military operations in one of the most famous battle-grounds of Europe.
- Italy—Abruzzi.** **Hassert.**
Dott. K. Hassert. Gli Abruzzi. Traduzione dal Tedesco di L. F. de Magistris. Teramo, 1897. Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. 16. L. F. de Magistris. Gli Abruzzi del Dottore Kurt Hassert. Roma, 1897. Size 9×6 , pp. 10. *Presented by the Author.*
- Italy—Apennines.** **Magistria.**
Luigi Filippo de Magistris. Per gli Appennini. Noterelle di cronaca geografica, topografia—geologia—orografia—agraria e paesaggio. Roma: A. Colanelli & G. Fabbri, 1894. Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. 56. Il Rizzi-Zannoni e il sistema Apulo-garganico. Notizia di L. F. De Magistris. (Estratto dalla *Rivista Geografica Italiana*, Annata iv., Fascicolo ii.—iii. 1897.) Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. 6. *Presented by the Author.*
- Italy—Friaul.** *Z. Deutschen u. Österreich. Alpenv.* 26 (1897): 358-383. **Pock.**
Aus den Bergen der südlichsten deutschen Sprachinseln. Die Sauris oder Zahre im Friaul. Von Julius Pock.
- Italy—Leghorn.** **Cattolica.**
Determinazione della Latitudine dell' osservatorio della R^a Accademia Navale di Livorno fatta nel 1897 secondo il metodo di Talcott da Pasquale Leonardi Cattolica. Genova: Tip. del R. Ufficio Idrografico, 1897. Size 13×10 , pp. 34. *Presented by the Italian Hydrographic Office.*
- Italy—Rome.** *B.S.G. Italiana* 11 (1898): 69-84. **Agostini.**
Esplorazioni idrografiche nei laghi vulcanici della Provincia di Roma. Nota preliminare del socio dott. Giovanni De Agostini. *With Plate.*
On the lakes of the Roman province, including the lakes of Bolsena, Bracciano, Castel Gandolfo, Vico, and several smaller, of all of which bathymetrical maps are

given. They are all roughly circular in form, with steep slopes from the edge, growing much more gentle towards the centre.

Italy—Sardinia.**Magistris.**

L. F. de Magistris. I "Riu Mannu" di Sardegna. Roma: G. Civelli, 1896. Size $7\frac{1}{2} \times 5$, pp. 8. *Presented by the Author.*

A discussion of the name "Riu Mannu" applied to a river in Sardinia.

Italy—Sicily.*Atti R.A. Lincei, Rendiconti* 6 (1897): 331-337.**Palazzo.**

Risultati delle determinazioni magnetiche in Sicilia, e cenni sulle perturbazioni nelle isole vulcaniche e nei dintorni dell' Etna. Nota di Luigi Palazzo.

Mediterranean.**Wells.**

Mediterranean Days. By Samuel Wells. London: Bradbury, Agnew & Co., 1897. Size $8 \times 5\frac{1}{2}$, pp. viii. and 224. *Illustrations. Presented by the Author.*

A lively account of a pleasure cruise on a tourist steamer in the Mediterranean.

ASIA.**Arabia.***Rev. Française* 22 (1897): 695-698.**Salaignac.**

Les fortifications de Cheïk-Saïd. Par A. Salaignac.

Armenia.*Nature* 57 (1898): 392-394.**Hughes.**

Notes on Some Volcanic Phenomena in Armenia. By Prof. T. McKenny Hughes, F.R.S. *With Illustrations.*

A note on this paper will be given.

Central Asia.*Verh. Ges. Erdk. Berlin* 25 (1898): 58-71.**Walther.**

Prof. Dr. Johannes Walther: Vergleichende Wüstenstudien in Transkaspien und Buchara.

Central Asia and Tibet.**Dutreuil de Rhina.**

J.-L. Dutreuil de Rhina. Mission scientifique dans la Haute Asie, 1890-1895. Première Partie Récit du Voyage (19 Février 1891—22 Février 1895). Paris: E. Leroux, 1897. Size 11×9 , pp. xvi. and 454. *Portrait, Map, Plates.*

This important volume will receive special notice.

China.*C. Rd., S.G. Paris* (1897): 401-405.**Brenier.**

Le voyage de la mission lyonnaise (Indo-Chine, Yun-nan, Kouï-tchéou, So-tchouan, Kouang-si, Hou-nan). Par M. Brenier. *With Map.*

China.**Rockhill.**

Diplomatic Missions to the Court of China. The Kotow Question. By William Woodville Rockhill. [Reprinted from the *American Historical Review*, vol. ii. Nos. 3 and 4, April and July, 1897.] Size $11 \times 7\frac{1}{2}$, pp. [34].

China—Kiauchou.*Verh. Ges. Erdk. Berlin* 25 (1898): 71-74.**Richthofen.**

Die Rechtschreibung des Namens Kiautschou. Von v. Richthofen.

Baron Richthofen discusses the proper European spelling of the name of the new German territory in China, pointing out that the usual form Kiao-chau is doubly erroneous, the true sound being rendered by *Kiau-chou*, the final *ou* being pronounced as separate letters, e.g. Kyow-cho-oo.

China—Kiauchou.*Petermanns M.* 44 (1898): 43-44.

Die Kiautschou-Bucht. *With Map.*

The map is on the scale of 1 : 750,000, and shows the limits of the German treaty territory and sphere of influence.

China—Kiau-chou.*Oester. Monats. Orient* 23 (1897): 133-139.**Hirth.**

Die Bucht von Kiau-tschau und ihr Hinterland. Von Dr. Friedrich Hirth. *With Map.*

China—Kiau-chou.*G.Z.* 4 (1898): 103-107.**Richthofen.**

Kiautschou, seine Weltstellung und voraussichtliche Bedeutung. Nach Ferdinand Freiherrn von Richthofen.

A note on this will be given.

India.*J.S. Arts* 46 (1898): 241-254.**Duff.**

Recreations of an Indian Official. By the Right Hon. Sir M. E. Grant Duff.

India—Frontier Campaign.**Fincastle and Elliott-Lockhart.**

A Frontier Campaign. A Narrative of the Operations of the Malakand and Buner Field Forces, 1897-1898. By the Viscount Fincastle and P. C. Elliott-Lockhart.

London: Methuen & Co., 1898. Size 8 x 5½, pp. 232. *Map and Illustrations.*
Price 6s. Presented by the Publishers.

Lord Fincaisle and Lieut. Elliott-Lockhart here give a concise account of the operations of the Malakand and Buner field forces in the recent border campaign. The narrative abounds with stirring episodes, and there is naturally much said of the physical character of the country in which the fighting was carried on. A somewhat rough map, on the scale of 4 miles to an inch, makes the puzzling topography of the section of the frontier dealt with clear enough to allow the reader to follow the whole proceedings intelligently.

India—Madras.

Report of the Condition and Progress of the G. V. Juggarow Observatory, Vizagapatam. Including the Results of Observations for the year 1896. Published by the General Committee, G.V. Juggarow Observatory, Vizagapatam. Calcutta, 1897. Size 9 x 6½, pp. 38. *Diagrams.*

India—Punjab, Shahpur District.

Gazetteer of the Shahpur District. By J. Wilson. Revised Edition, 1897. Compiled and Published by Authority of the Punjab Government. Lahore, 1897. Size 10 x 7, pp. xii., 240, and lvi. *Map.*

India—Wrecks.

Return of Wrecks and Casualties in Indian Waters for the year 1896. . . . Prepared by B. P. Creagh, Commander R.N.M. Calcutta, 1897. Size 13 x 8½, pp. 76. *Chart and Diagram.* Presented by Commander B. P. Creagh.

Indo-China—Mekong. *A travers le Monde, Tour du Monde 4* (1898): 49-52. Combes. *La Navigation du Mekong.* Par Paul Combes. *With Illustrations.*

Japan.

The Dolmens and Burial Mounds in Japan. Communicated to the Society of Antiquaries by William Gowland. London: Printed by Nichols & Sons, 1897. Size 12 x 9½, pp. 86. *Map and Illustrations.* Presented by the Author.

A careful study of pre-historic monuments in Japan, with numerous photographs of dolmens, mounds, and objects found in them, and a map showing their distribution over the Japanese islands.

Japan—Formosa.

The Articles of Christian Instruction in Favorlang-Formosan, Dutch, and English from Vertrecht's Manuscript of 1650, with Paalmanazar's Dialogue between a Japanese and a Formosan, and Happart's Favorlang Vocabulary. Edited by Rev. Wm. Campbell. London: Paul & Co., 1896. Size 9 x 7, pp. xx. and 200. *Presented by the Editor.*

Interesting as specimens of the aboriginal speech of Formosa.

Japan—Formosa. *Petermanns M.* 44 (1898): 33-36. Wirth. *Die eingebornen Stämme auf Formosa und den Liu-Kiu.* Von Dr. Albrecht Wirth.

Japan—Harbours. *J.G. Tōkyō G.S.* 9 (1897): 493-495. Nasa. *Harbors of Japan.* By T. Nasa. [In Japanese.]

Malay Archipelago—British Borneo. *J.R. Colonial I.* 29 (1898): 107-112. Gueritz. *British Borneo.* By E. P. Gueritz.

This is an abstract of the original paper, which is preserved for reference in the Library of the Colonial Institute.

Malay Archipelago—Java. *Ann. Hydrographie* 26 (1898): 7-10. Hegemann. *Ueber Häfen an der Nordküste von Java.* Aus dem Reisebericht des Kapit. A. Hegemann.

Malay Archipelago—Java. *B.S.R. Belge G.* 21 (1897): 533-539. Leclercq. *Voyage aux Volcans de Java.* Par Jules Leclercq. *With Map.*

Malay Archipelago—Java. Les Restes de la Civilisation Hindoue à Java. Par Jules Leclercq. [Extrait des *Bulletins de l'Académie royale de Belgique*, 3^{me} série, tome xxxiv. No. 7 (juillet), 1897.] Bruxelles, 1897. Size 9 x 6, pp. [26]. Presented by the Author.

Malay Archipelago—Java. Un Séjour dans l'île de Java. Le Pays, les Habitants, le Système Colonial. Par Jules Leclercq. Paris: E. Plon, Nourrit et Cie, 1898. Size 7½ x 5, pp. 296. *Map and Illustrations.* Presented by the Author.

M. Leclercq has added to his thirteen or fourteen books of travel a new volume describing his visit to Java in 1895. His tour extended from Batavia to Buitenzorg,

Bandong and its neighbourhood, Garoet, Djokjakarta and Boro Boedoe, Soerakarta, Soerabaya, and Malang. A chapter is devoted to the Dutch colonial system; there are a few illustrations and a sketch-map.

- Malay Archipelago—Java.** *Petermanns M.* 44 (1898): 25-33. Verbeek.
Die Geologie von Java. Von Dr. E. D. M. Verbeek. *With Map.*
- Malay Archipelago—North Borneo.** *Mission Field* 43 (1898): 60-66. Perry.
The Muruts and Marutland. An Account of the New Mission in Central North Borneo. By the Rev. F. Perry. *With Illustrations.*
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Report by the Resident-General of the Federated Malay States to His Excellency the High Commissioner (Sir C. B. H. Mitchell). Taiping, 1897. Size 13½ x 8½, pp. 10.
The Federated States are Perak, Selangor, Negri Sembilan, and Pahang.
- Malay States—Negri Sembilan.** Birch.
Annual Report of the State of Negri Sembilan for the year 1896. By E. W. Birch. Kuala Lumpur, 1897. Size 13½ x 8½, pp. 34.
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Notes on Mining Life and General Features of Pahang, Malay Peninsula. By W. Bertrand Roberts, J.R.
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Annual Report on the State of Perak for the year 1896. By W. H. Treacher, C.M.G. Taiping. Size 13½ x 8½, pp. 62.
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- Persia.** Schindler.
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Marco Polo's Camadi. By General A. Houtum Schindler.
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Recent Journeys in Persia. By Captain P. Molesworth Sykes. From the *Geographical Journal* for December, 1897. Size 10 x 6½, pp. 30. *Map and Illustrations.*
- Persia—Bakhtiari Hills.** Burn.
J. Asiatic S. Bengal 66 (Pt. 1) (1897): 170-179.
The Bakhtiari Hills. An itinerary of the road from Isfahan to Shushtar. By Richard Burn.
- Persia—Elburz.** Wells.
Scottish G. Mag. 14 (1898): 1-9.
Across the Elburz Mountains to the Caspian Sea. By Lieut.-Colonel H. L. Wells.
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Der Persische Meerbusen, Geschichte und Morphologie. Von Dr. Siegfried Genthe. *With Map.*

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With the Mission to Menelik, 1897. By Count Gleichen. London: E. Arnold, 1898. Size 9 x 6, pp. xii. and 364. *Maps and Illustrations.* Price 16s. *Presented by the Publisher.*
This will be referred to along with other books on Africa.

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Voyage du prince H. d'Orléans et de MM. de Poncins et Mouvrillon. D'Addis
Abbaba à Djibouti. *With Map.*
- Africa.** **Deville.**
Partage de l'Afrique, Exploration, Colonisation, État Politique. Par M. Victor
Deville. Paris: J. André et Cie., 1898. Size 7½ × 5, pp. 460. *Maps. Price 5 fr.*
A short sketch of the history of exploration in Africa, followed by details of the
numerous conventions and treaties by which the present political divisions of the
continent are determined.
- Algeria.** *A travers le Monde, Tour du Monde 4* (1898): 33-36. **Blanchet.**
La Tunisie des Beni-Hammad. Par P. Blanchet. *With Illustrations.*
- Algeria.** *Ann. G. 7* (1898): 34-54. **Bussan.**
Le développement géographique de la colonisation agricole en Algérie. Par M.
H. Bussan. *With Map.*
On the method and the progress of colonization in Algeria by the settlement of
European farmers, cultivating the land allotted to them in the interior of the country.
The map, on the scale of 1 : 2,500,000, distinguishes cultivated plains, high plains with
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Walter Augustine Fitzgerald. *With Maps, Illustrations, and Appendices.* London:
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El mapa de la región de Anaga (Islas Canarias). Por D. M. de Ossuna y Van-
den-Heede.
- Canary Islands.** *C. Rd. 126* (1898): 439-441. **Richard.**
Sur la faune des eaux douces des îles Canaries. Note de M. Jules Richard.
- Congo State—Coffee.** *B.S. d'Études colon 4* (1897): 410-433. **Bouckenoghe.**
La culture du Caféier dans le Haut-Congo. Par Valère Bouckenoghe.
- East Africa.** **Neumann.**
Elephant-Hunting in East Equatorial Africa; being an Account of Three Years'
Ivory-Hunting under Mount Kenia, and among the Ndorobo Savages of the Lorogi
Mountains, including a trip to the North End of Lake Rudolph. By Arthur H.
Neumann. London: Rowland Ward, 1898. Size 9½ × 6½, pp. xx. and 456.
Map and Illustrations. Price 21s. Presented by the Publisher.
This will be referred to along with other books on Africa.
- East Africa—Nile Sources.** *Z. Ges. Erdk. Berlin 32* (1897): 303-342. **Martonne.**
Die Hydrographie des oberen Nil-Beckens. Von E. de Martonne. *With Maps*
and Profiles.
This will be specially referred to.
- East Africa—Somaliland.** *Scottish G. Mag. 14* (1898): 57-73. **Pease.**
Some Account of Somaliland: with Notes on Journeys through the Gadabūrai and
Western Ogaden Countries, 1896-1897. By Alfred E. Pease, n.r.
- Egypt—Sudan.** **Dehérain.**
Le Soudan Égyptien sous Mehemet Ali. Par Henri Dehérain. Paris: G. Carré
et Naud, 1898. Size 10 × 6½, pp. xii. and 384. *Maps. Presented by the Publishers.*
This will be referred to along with other books on Africa.

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My Recent Journey from the Nile to Suakim. By Frederic Villiers.
- French Congo.** *C. Rd. S.G. Paris* (1897): 425-428. Bouysson.
Mission agricole et scientifique de M. Bouysson. La région côtière du nord du Congo.
- French Sudan.** *B.S.G. Paris* 18 (1897): 312-339. Imbert.
Reconnaissances au nord de Bakel (avril-mai 1894). Par le Capitaine Imbert.
With Map and Illustrations.
- German East Africa—Uhehe.** *Deutsche Kolonialzeitung* 11 (1898): 49-51. Arning.
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- Morocco.** *B.S.G. Madrid* 39 (1897): 173-182. Gaudeaux.
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- Canada.** Tyrrell.
Geological Survey of Canada. G. M. Dawson, C.M.G., etc., Director. Part F. Annual Report, vol. ix., 1896. Report on the Doobaunt, Kazan, and Ferguson Rivers and the North-West Coast of Hudson Bay, and on two overland routes from Hudson Bay to Lake Winnipeg. By J. Burr Tyrrell. Ottawa, 1897. Size 10 × 6½, pp. 218. *Maps and Illustrations.*
- Canada—British Columbia.** Gosnell.
The Year-Book of British Columbia and Manual of Provincial Information, to which is added a Chapter containing much special information respecting the Canadian, Yukon, and Northern Territory generally. R. E. Gosnell. Victoria, B.C., 1897. Size 9 × 6, pp. 500. *Maps and Illustrations. Price 12s.*
- Canada—Climate.** *Scottish G. Mag.* 14 (1898): 73-81. Stupart.
The Climate of Canada. By Prof. R. F. Stupart.
- Canada—Earthquakes.** McLeod and Callendar.
McGill University. Papers from the Department of Physics. No. 2.—Our Record of Canadian Earthquakes. By C. H. McLeod and Hugh L. Callendar. [Reprinted from the *Canadian Record of Science*, January, 1897.] Montreal, 1897. Size 10 × 7, pp. [4]. *Diagram.*
- Canada—Geological Survey.** White.
The Topographical Work of the Geological Survey of Canada. By J. White. From the *Geographical Journal* for December, 1897. (Revised.) Size 10 × 6½, pp. 8.
- Canada—Mineral Industry.** Ingall.
Geological Survey of Canada. G. M. Dawson, C.M.G., etc., Director. Part S. Annual Report, vol. ix. Section of Mineral Statistics and Mines, Annual Report for 1896. Elfric Drew Ingall. Ottawa, 1897. Size 10 × 6½, pp. 172.
- Canada—New Brunswick.** *B. Nat. Hist. S. New Brunswick* 15 (1897): 65-82. Duff.
Tidal Phenomena of the St. John River at Low Summer Level. By A. Wilmer Duff, M.A. *With Diagram.*
Also a separate copy.
- Canada—Ontario.**
Fifth Report of the (Ontario) Bureau of Mines, 1895. Toronto, 1896. Size 10 × 6½, pp. viii. and 298. *Illustrations.*
- Canada—Ontario and British Columbia.** *J.R. Colonial I.* 29 (1898): 145-171. Rathbone.
The Goldfields of Ontario and British Columbia. By Edgar P. Rathbone.
- Canada—Quebec.** *Rev. G.* 42 (1898): 104-124. Tricoche.
Notes de voyage dans un coin perdu du Canada, lac Megantic (province de Quebec). Par G. N. Tricoche. *With Map.*
A sympathetic account of a visit by a French tourist to a rural district in Quebec. The author discusses the deterioration of the French language in Canada, and the feeling of the people towards France.

Canada—Western.

Manitoba and the North-West Territories, Assinibola, Alberta, Saskatchewan, in which are included the newly discovered Gold Fields of the Yukon. Information as to the Resources and Climates of these countries for intending Farmers, Ranchers, and Miners. 1897. Ottawa: Government Printing Bureau, 1897. Size 10 x 7, pp. 46. *Map and Illustrations.*

Canada—Yukon.**Dyer.**

The Routes and Mineral Resources of North-Western Canada. By E. Jerome Dyer. Published under the Auspices of the Incorporated London Chamber of Mines. London: G. Philip & Son, 1898. Size 9 x 6, pp. xx. and 268. *Maps and Section. Price 6s. Presented by the Publishers.*

The greater part of this book is devoted to an account of the Yukon district and the routes by which it may be reached. It is the completest discussion of the subject yet produced, and the large-scale map showing the routes and the auriferous areas will prove of great value. An extensive bibliography gives the titles of practically all that has previously been written on the Yukon district.

Mexico—Huichol Indians.**Lumbholtz.**

The Huichol Indians of Mexico. By Carl Lumbholtz. [Extracted from *Bulletin of the American Museum of Natural History*, vol. x. Article 1, pp. 1-14.] New York, January 21, 1898. Size 10 x 6½. *Illustrations. Presented by the Author.*

The Huichol Indians are a little-known tribe which has been carefully studied by Mr. Lumbholtz. They live in the state of Jalisco.

Mexico—Tacubaya. B. Observatorio Astron. Nac. Tacubaya 2 (1897): 45-50.**Valle.**

Longitud del Observatorio Astronómico Nacional de Tacubaya. Por Felipe Valle.

Mount St. Elias. Sierra Club B. 2 (1898): 129-148.**Filippi.**

The Expedition of His Highness Prince Luigi Amedeo of Savoy, Duke of Abruzzi, to Mt. St. Elias in Southern Alaska. By Dr. Filippo de Filippi. *With Portrait, Map, and Plate.*

North America—Coronado's March. B. American G.S. 29 (1897): 399-431.**Dellenbaugh.**

The True Route of Coronado's March. By F. S. Dellenbaugh. *With Map. Also a separate copy, presented by the Author.*

A study of Coronado's march from Mexico northwards and eastwards to the Arkansas river.

United States—Arizona.**Mindeleff.**

Cliff Ruins of Canyon de Chelly, Arizona. By Cosmos Mindeleff. Sixteenth Annual Report of the Bureau of American Ethnology, 1894-95. Washington, 1897. Pp. 79-198. *Maps and Illustrations.*

United States—Colorado. Engineering Mag. 14 (1898): 829-841.**Crafts.**

Peculiar Features of Irrigation Engineering in Colorado. By H. A. Crafts. *With Illustrations.*

United States—Kansas.**Hay.**

Department of the Interior. Bulletin of the United States Geological Survey. No. 137. The Geology of the Fort Riley Military Reservation and Vicinity, Kansas. By Robert Hay. Washington, 1896. Size 9 x 6, pp. 36. *Map and Illustrations. Presented by the Survey.*

CENTRAL AND SOUTH AMERICA.**Argentina—Aconcagua. Alpine J. 19 (1898): 1-4.****Fitz Gerald.**

The Expedition to Aconcagua. By Edward A. Fitz Gerald.

Bolivia and Paraguay. Rev. Mensual, Rep. Paraguay 2 (1897): 266-278.**Decoud.**

Diplomacia Paraguayo-Boliviana. Por José S. Decoud.

Brazil. Petermanns M. 44 (1898): 36-40.**Goeldi.**

Vorläufige Mitteilung über eine Forschungsreise nach dem Oberlauf des Rio Capim, Staat Pará. Von Dr. Emil A. Goeldi.

Brazil—Marajo Island. Globus 73 (1898): 69-73, 90-93.**Katser.**

Eine Forschungsreise nach der Insel Marajó (Amazonas-Mündung). Von Dr. Friedrich Katser. I.

The journey here described took place in November, 1896, and the paper describes the island itself, as well as the condition of the Amazon river.

- Paraguay.** *Globus* 73 (1898): 73-78. **Ehrenreich.**
 Neue Mittheilungen über die Guayaki (Steinzeitmenschen) in Paraguay. Von Dr. P. Ehrenreich. *With Illustrations.*
- Peru.** *Science* 7 (1898): 133-136. **Ward.**
 Climatic Contrasts along the Oroya Railway. By R. de C. Ward.
- Salvador.** *B. American G.S.* 29 (1897): 393-398. **Littlehales.**
 Recent Survey of Jiquilisco Bay and El Triunfo, the New Port of Salvador. By G. W. Littlehales. *With Chart.*
 An important piece of surveying, which opens a sheltered harbour to trade on the coast of Salvador. Notes are given of the resources of the surrounding country.
- Venezuela.** *B.S.G. Com. Bordeaux* 30 (1897): 444-457; 21 (1898): 7-12. **Vincent and Humbert.**
 Le Venezuela; période des Welser (1528-1546). Par le Dr. L. Vincent et J. Humbert.

AUSTRALASIA AND PACIFIC ISLANDS.

- Australasia—Handbook.**
 The Australian Handbook (incorporating New Zealand, Fiji, and New Guinea): Shippers, Importers, and Professional Directory and Business Guide for 1898. London, etc.: Gordon & Gotch. Size 10 x 6½, pp. 650. *Maps, Plans, Plates.*
- Australia.** *J.R. United Service* 1. 42 (1898): 128-158. **Gordon.**
 The Federal Defence of Australia. By Colonel J. M. Gordon.
- Australia—History.** **Rusden.**
 History of Australia. By G. W. Rusden. Second Edition. 3 vols. Melbourne: Melville, Mullen & Slade, 1897. Size 8½ x 5½, pp. (vol. i.) xxiv. and 626; (vol. ii.) xiv. and 688; (vol. iii.) x., 522, and xcii. *Presented by the Author.*
 This will be specially noticed.
- British New Guinea.** **Thomson.**
 Anniversary Address to the Royal Geographical Society of Australasia, Brisbane. By the President, J. P. Thomson. (Delivered at the Anniversary Meeting of the Royal Geographical Society of Australasia, Brisbane, July 29, 1897.) Size 8½ x 6, pp. 14.
- Ellice Group.**
 Australian Museum, Sydney. Memoir III. The Atoll of Funafuti, Ellice Group: its Zoology, Botany, Ethnology, and General Structure based on Collections made by Mr. Charles Hedley. Part 5. Sydney: Published by order of the Trustees, 1897. Size 10 x 6½, pp. 305-345. *Plates. Presented by the Australian Museum.*
- Fiji Islands.** *American J. Sci.* 5 (1898): 113-123. **Agassiz.**
 The Islands and Coral Reefs of the Fiji Group. By Alexander Agassiz.
- New South Wales.** **Coghlan.**
 The Wealth and Progress of New South Wales, 1895-6. By T. A. Coghlan. Vol. ii. Sydney, 1897. Size 9 x 6, pp. 493-1030. *Presented by the Agent-General for New South Wales.*
 This volume deals with population and social and economic statistics.
- Queensland.** **Jack.**
 Queensland, Department of Mines. Geological Survey—Bulletin No. 6. Catalogue of the Exhibits in the Queensland Mining Court, Queensland International Exhibition, 1897. By R. L. Jack, Government Geologist. Second Edition. Brisbane, 1897. Size 9 x 5½, pp. 72.
- Queensland.** **Jack.**
 Queensland. Notes on two traverses of the Bunya Bunya Range and a visit to Brovinia Gold Field. By Robert L. Jack, Government Geologist. Brisbane, 1896. Size 13½ x 8½, pp. 4.
- Queensland.** **Rands.**
 Queensland. Croydon Gold Field. (Report by William H. Rands, on the.) Brisbane, 1896. Size 13½ x 8½, pp. 66. *Maps and Plates.*
- Queensland.** **Rands.**
 Queensland. Report on the Horn Island Gold Field. (With a Geological Map.) [By Mr. William H. Rands.] Brisbane, 1896. Size 13½ x 8½, pp. 6.

South Pacific.

Search for Reported Dangers in South Pacific to the Northward of Fiji and for La Brillante Shoal and Melanie Rock. By H.M.S. *Penguin* (Captain A. M. Field); and H.M.S. *Waterwitch* (Lieut. and Commander J. W. Combe), 1895-96. With Lists of Soundings and Temperatures. Soundings between New South Wales and Fiji, the Ellice Group and Fiji, Fiji and New Zealand, and New Zealand and Tasmania. London: J. D. Potter, 1897. Size 13½ × 8½, pp. 44. Price 4s. 6d.

Western Australia.

Western Australia. Statistical Register for the year 1896, and previous years. Part II. Public Finance. Perth, 1897. Size 13½ × 8½, pp. 42.

POLAR REGIONS.**Andrée's Expedition. Lachambre and Machuron.**

Andrée. Au Pôle Nord en Ballon. Par Henri Lachambre et Alexis Machuron. Paris: Librairie Nilsson, [1898]. Size 7½ × 5, pp. 250. *Portraits and Illustrations.* Price 4 fr.

Andrée and his Balloon. By Henri Lachambre and Alexis Machuron. London: A. Constable & Co., 1898. Size 8 × 5½, pp. 306. *Portraits and Illustrations.* Price 6s. Presented by the Publishers.

Messrs. Andrée, Strindberg, and Fränkel left the north of Spitsbergen in the balloon *Ornen*, with the object of carrying out polar exploration, on July 11, 1897; the last news received was a letter by pigeon post, dated July 13, when the balloon was in 82° 2' N., 15° 5' E. This book, by the constructors of the balloon, describes all the preliminary arrangements and the departure of the expedition, with great detail and numerous illustrations.

Antarctic. B.S.G. Italiana 11 (1898): 27-34. Faustini.

Le "Apparances of land" nella zona polare antarctica. Nota del socio prof. Arnaldo Faustini.

Also separate copy. Presented by the Author.

A note on this will be given.

Arctic—Franz Josef Land. Jackson.

Three Years' Exploration in Franz Josef Land. By Frederick G. Jackson. [From the *Geographical Journal* for February, 1898.] Size 10 × 6½, pp. 26. *Map and Illustrations.*

Arctic—Expedition. Norske G.S. Aarvog 8, 1896-97 (1897): 53-76. Nansen.

Prof. dr. Fridtjof Nansen: Den norske polarekspedition 1893-96. *With Map.*

Greenland. National G. Mag. 9 (1898): 1-11. Stein.

Three Weeks in Hubbard Bay, West Greenland. By Robert Stein. *With Maps and Illustrations.*

Greenland—Eakimo. Die Natur 47 (1898): 37-40. Wächter.

Der grönländische Eakimo. Von Ernst Wächter.

MATHEMATICAL GEOGRAPHY.**Cartography. Globus 73 (1898): 93-98. Hammer.**

Die Karten von Wangen und von Lindau aus der ersten Hälfte des 17 Jahrhunderts. Von Prof. Dr. Hammer. *With Maps.*

Description of some of the famous maps of the seventeenth century with regard to the style of their execution.

Earth's Rotation. Meteorolog. Z. 14 (1897): 448-463. Ekholm.

Ueber die Einwirkung der vertikalen komponente der ablenkenden Kraft der Erdrotation auf die Luftbewegung. Von Nils Ekholm.

Longitudes. Hills.

On the Determination of Terrestrial Longitudes by Photography. By Captain E. H. Hills, R.E. [Reprinted from the *Memoirs of the Royal Astronomical Society*, vol. liii.] London: Royal Astronomical Society, 1897. Size 11½ × 9, pp. [24]. Presented by the Author.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.**Ballooning. C. Rd. 126 (1898): 364-366. Stelling.**

Sur la troisième ascension internationale des ballons-sondes. Note de M. Ed. Stelling.

Records of high ascents from St. Petersburg.

- Forests and Rainfall.** *Engineering Mag.* 14 (1898): 807-816. **Wilson.**
The Relation of Forestation to Water-Supply. By Herbert M. Wilson.
- Geomorphology.** *Knowledge* 21 (1898): 25-28. **Cole.**
The Floor of a Continent. By Grenville A. J. Cole. *With Illustrations.*
On the influence of the most ancient rocks in developing the features of a country.
- Geomorphology.** *Natural Sci.* 13 (1898): 117-122. **Gregory.**
Suess's Theories of Geographical Evolution. By J. W. Gregory, D.Sc.
An able review and summary of the French translation of *Das Anlitz der Erde.*
- Glacial action.** *Alpine J.* 19 (1898): 29-40. **Bonney.**
The Kirchet and its Critics. By Prof. T. G. Bonney, D.Sc., etc.
A reply to Dr. Russell Wallace's paper on the Aar glacier in the *Fortnightly Review* for August, 1896, contending that the excavatory powers of ice are far inferior to the work believed by Dr. Wallace to have been performed by it.
- Land-sculpture.** *Deutsche Rundschau* G. 20 (1898): 145-150, 205-210. **Lendenfeld.**
Die Nivellirung der Erdoberfläche. Von R. v. Lendenfeld.
On the part played by atmospheric erosion in forming the features of the Earth's surface.
- Meteorology.** **Mohr.**
Grundzüge der Meteorologie. Die Lehre von Wind und Wetter nach den neuesten Forschungen gemeinschaftlich dargestellt von H. Mohn. Fünfte . . . Auflage. Berlin: D. Reimer, 1898. Size 9 x 6, pp. xii. and 420. *Maps.*
This important work has been revised and improved, many sections rewritten, and the climatological maps re-drawn so as to give effect to the most recent conclusions.
- Oceanography.** *C. Rd.* 126 (1898): 311-314. **Monaco.**
Sur la quatrième campagne de la *Princesse-Alice.* Par S. A. S. Albert 1^{er}, Prince de Monaco.
On the cruise of June, 1897, with a chart of the *Princesse Alice* bank, in lat. 38° N., long. 34° W. The position of this bank was erroneously given in the *Journal*, vol. ix. (1897), p. 566.
- Oceanography.** *G. Z.* 4 (1898): 32-46, 91-102. **Schott.**
Die Ozeanographie in den Jahren 1895 und 1896, Ein zweiter Bericht über Meereskunde. Von Dr. Gerhard Schott.
- Oceanography—Fauna.** *C. Rd.* 126 (1898): 441-443. **Locard.**
Sur l'aire de dispersion de la faune malacologique des grands fonds de l'océan Atlantique boréal. Note de M. Arnould Locard.
- Plant-Geography.** *Rev. Scientifique* 8 (1897): 684-690. **Constantin.**
Les végétaux et les milieux cosmiques. Par M. J. Constantin.
On the influence of different climates on plants.
- Plant-Geography.** *Scottish G. Mag.* 14 (1898): 18-23. **Elliot.**
Primary conditions of Tropical Production. Being an Introduction to Economic Botany. By G. F. Scott Elliot, M.A.
- River-Study.** *Yezhegodnik Imp. Russian G.S.* 6 (1897): Append. 1-52. **Boguslavsky.**
Instruction for the Exploration and Description of Rivers. By N. A. Boguslavsky. Edited by A. A. Tillo. [In Russian.]
- River-Study.** **Penck.**
Potamology as a Branch of Physical Geography. By Prof. Albrecht Penck, Ph.D. From the *Geographical Journal* for December, 1897. Size 10 x 6½, pp. 6.
- Sedimentation.** *Rev. G.* 41 (1897): 161-171, 256-265, 336-343. **Girard.**
La sédimentation comparée. Par J. Girard.
- Seismology.** *Math. u. Naturw. Berichte Ungarn* 13 (1897): 418-464. **Kövesligethy.**
Neue geometrische Theorie der seismischen Erscheinungen. Von Dr. R. v. Kövesligethy.
Mathematical treatment of seismic phenomena, based on such physical constants as mean density, rigidity, rotation-velocity, etc.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

- Anthropology.** *Rev. Scientifique* 9 (1898): 161-171. **Vignoa.**
Les sociétés indigènes et le problème de la colonisation. Par M. Louis Vignoa.

- Anthropology.** *Nature. Wochenschrift* 13 (1898): 1-8. **Wilser.**
Menschenrassen und Weltgeschichte. Von Dr. Ludwig Wilser.
- Commercial Geography.** **Salesces.**
B. Comité l'Afrique Française 7 (1897): 291-306, 336-344, 377-388.
Les voies de pénétration dans les pays tropicaux. Par M. E. Salesces.
- Commercial Geography—Coffee.** *Kolonial Jahrb.* 10 (1897): 153-188. **Fesca.**
Ueber Kaffeekultur. Von Professor Dr. M. Fesca.
- Commercial Geography—Communications.** *G.Z.* 3 (1897): 624-634, 694-704. **Hettner.**
Der gegenwärtige Stand der Verkehrsgeographie. Von Alfred Hettner.
A full summary of the present position of the study of routes and means of transport, by land and sea, as a branch of geography.
- Commercial Geography—Gold.** *G.Z.* 3 (1897): 601-618, 657-680. **Elterlein.**
Das Vorkommen des Goldes in der Natur. Von Dr. A. von Elterlein.
On the distribution of gold in nature, and the annual production of the metal in different countries.
- Historical—Map.** **Christy.**
On an Early Chart of the North Atlantic, preserved in the Royal Library at Stockholm. By Miller Christy. London: Printed for the Author, 1897. Size 9 × 5½, pp. 24. *Chart. Presented by the Author.*
This will be specially noticed.
- Historical—Maps.** **Marcel.**
Note sur quelques acquisitions récentes de la Section des Cartes et collections géographiques de la Bibliothèque Nationale. Par Gabriel Marcel. Extrait des *Comptes Rendus de la Société de Géographie*, No. 16 et 17 (1897). Paris: Société de Géographie, 1898. Size 9 × 6, pp. 14. *Presented by the Author.*
A description of a number of ancient maps recently acquired by the National Library in Paris.
- Historical—Rivers.** **Stürenburg.**
Die Bezeichnung der Flussufer bei Griechen und Römern. Von Prof. Dr. Heinrich Stürenburg. Beigabe zum Jahresbericht des Gymnasiums z. heil. Kreuz zu Dresden über das Schuljahr 1896-97. Dresden: B. G. Teubner, 1897. Size 10 × 8½, pp. 46.
- Historical—Silk route.** **De la Blache.**
Note sur l'origine du commerce de la soie par voie de mer. Par M. Vidal de la Blache. Extrait des *Comptes rendus de l'Académie des inscriptions et belles-lettres*, 1897. Size 9 × 5½, pp. 8. *Presented by the Author.*
- Italians Abroad.** *Riv. G. Italiana* 4 (1897): 502-513, 545-553. **Marsen.**
Gli italiani all'estero del Prof. Luigi Marsen.
A study of the condition of Italians in foreign countries, particularly in South America.
- Political Geography.** **Ratzel.**
Politische Geographie. Von Dr. Friedrich Ratzel. München und Leipzig: R. Oldenbourg, 1897. Size 10 × 7, pp. xx. and 716. *Price* 16s.
This will be the subject of special notice.
- Tropical Diseases.** *B.S. d'Études coloniales* 4 (1897): 434-450. **Dryepont.**
Une Mission médicale au Congo. Par le docteur Dryepont.
A discussion on tropical diseases, with special reference to the training of a medical man to be appointed by the Belgian Society of Colonial studies, to proceed to the Congo in order to investigate the diseases common there.

BIOGRAPHY.

- Abbadie.** *C. Rd.* 126 (1898): 173-181. **Hatt.**
Notice sur la vie et les travaux de M. d'Abbadie. Par M. Hatt.
M. Antoine Thomson d'Abbadie, born at Dublin in 1810, travelled extensively in Africa and elsewhere, and died in March, 1897, in Paris.
- Alcock.** *Blackwood's Mag.* 162 (1897): 834-852. _____
Sir Rutherford Alcock and the Far East.
An appreciation of the work of Sir Rutherford Alcock.

- Becker.** *Deutsche Rundschau G. 20* (1897): 136-137.
 Dr. Karl Becker. *With Portrait.*
 A German statistician (1824-1896).
- Bernhardi.** *Naturw. Wochenschrift 12* (1897): 481-486. **Hildebrandt.**
 Reinhard Benhardi. Zum Gedächtnisse eines deutschen Naturforschers, 1797.
 11 October, 1897. Von Max Hildebrandt.
 Bernhardi was particularly engaged in the study of the erratic blocks of the North European plain.
- Biographical Dictionary.** **Patrick and Groome.**
 Chambers's Biographical Dictionary. The Great of all Times and Nations.
 Edited by David Patrick, LL.D., and Francis Hinde Groome. London and
 Edinburgh: W. & R. Chambers, 1897. Size 8½ x 6, pp. 1002.
 A compact book of reference.
- Cabot.** *Rev. G. 41* (1897): 321-335. **Harrisse.**
 Sébastien Cabot, pilote-major d'Espagne, considéré comme navigateur. Par H.
 Harrisse. *With Map.*
- Charlevoix de Villers.** **Grandjean.**
B.S.G. Commerc. Bordeaux 20 (1897): 341-354, 369-380.
 Le baron Charlevoix de Villers. Par Ch. Grandjean.
 A French engineer of the eighteenth century, who investigated the moving sands
 of the landes, and devised means of reclaiming land.
- Dalorco.** *Riv. G. Italiana 4* (1897): 282-294, 361-369. **Magnaghi.**
 Angellinus de Dalorco, cartografo Italiano della prima metà del secolo xiv. del
 Prof. Alberto Magnaghi.
 On the fourteenth century cartographer, Angellinus de Dalorco, and his work.
- German Geographers.** *G.Z. 3* (1897): 507-514, 557-566, 618-624. **Hantzsch.**
 Die deutschen Geographen der Renaissance. Von Viktor Hantzsch.
 Treats of German explorers, cosmographers, and cartographers of the period of the
 revival of geography.
- Green.** *P.R.S. 62* (1897): v.-ix.
 Alexander Henry Green, M.A., F.R.S., F.G.S., Professor of Geology in the University
 of Oxford.
- Hubbard.** *Science 6* (1897): 974-977.
 Gardiner Greene Hubbard.
 Biographical notice of the late President of the National Geographic Society,
 Washington. See also *National G. Mag. 8* (1897), 345.

GENERAL.

- British Colonies.** **Zimmermann.**
 Die Europäischen Kolonien. Zweiter Band. Die Kolonialpolitik Grossbritanniens.
 Erster Theil. Von den Anfängen bis zum Abfall der Vereinigten Staaten, von
 Alfred Zimmermann. Berlin: E. S. Mittler und Sohn, 1898. Size 9½ x 6, pp. xvi.
 and 480. *Maps.*
 A careful historical study of the expansion of the British empire from the first
 voyage of Cabot to 1784.
- Educational.** *Scottish G. Mag. 14* (1898): 81-88. **Herbertson.**
 The Parlous Plight of Geography in Scottish Education. By A. J. Herbertson.
- Educational—Pictures.** **Dubois and Guy.**
 Album Géographique. Par MM. Marcel Dubois et Camille Guy. Tome Premier.
 Aspects généraux de la nature. Paris: A. Colin et Cie., 1896. Size 11½ x 9,
 pp. vi., xiv., and 248. *Illustrations.* Price 15s.
 A collection of illustrations of unequal age and merit, but well grouped according to
 an excellent plan.
- Educational—Textbook.** **Lyde.**
 A Geography of North America, including the West Indies. By Lionel W. Lyde.
 London: A. & C. Black, 1898. Size 7 x 5, pp. vi. and 116. Price 1s. *Presented
 by the Author.*
 A school-book constructed on sound educational principles, not loaded with over-
 precise statistics, and for the most part well up to date. Scarcely sufficient prominence

is given to the rapid development of the far west of Canada, and especially to the enormous strides being made in the Kootenay district. The book is an excellent attempt to supply a minimum of well-digested information.

Geographical Dictionary.

Garollo.

Manuali Hoepli. Prof. G. Garollo. *Dizionario Geografico Universale*. Quarta Edizione. Milan: Ulrico Hoepli, 1898. Size $6\frac{1}{2} \times 4\frac{1}{2}$, pp. x. and 1452. *Presented by the Publisher.*

A remarkable little book containing 114,000 place-names, with a few notes and statistics regarding each.

Geographical Speculation.

Zetetic Cosmogony; or Conclusive Evidence that the World is not a Rotating, Revolving Globe, but a Stationary Plane Circle. By Rectangle. Durban, 1897. Size $8 \times 5\frac{1}{2}$, pp. 46. *Presented by the Author.*

This is interesting, as bearing on the need for improvement in geographical education.

Geography as a Science. *Rev. G. 43* (1898): 81-93.

Drapeyron.

La co-ordination en géographie. Par L. Drapeyron.

M. Drapeyron demonstrates the part played by topography in unifying the science of geography.

Geography as a Science. *Die Natur 47* (1898): 73-75.

Ule.

Geographie eine Naturwissenschaft. Von Willi Ule.

A note on this appeared in the *Journal* for March, p. 303.

Geography—Recent Advances.

Günther

Jahresb. Frankfurter Ver. G. u. Statistik 60 (1895-96 (1897)): 97-114.

Die Erdkunde in den letzten zehn Jahren. Festrede, bei der sechzigjährigen Jubelfeier des Vereins am 9 December 1896 gehalten von Prof. Dr. Siegmund Günther.

A supplement to Prof. Fischer's summary of the advances of geography in the half-century ending in 1886, published in the *Jahresbericht* for that year, p. 127. It deals mainly with German work, perhaps more even than the preponderance in number of German geographers demands.

German Colonies.

Luschan.

Beiträge zur Völkerkunde der deutschen Schutzgebiete. Von Felix von Luschan. Erweiterte Sonderausgabe aus dem "Amtlichen Bericht über die Erste Deutsche Kolonial Ausstellung" in Treptow 1896. Berlin: D. Reimer, 1897. Size $14 \times 10\frac{1}{2}$, pp. 88. *Plates. Presented by the Publisher.*

A fine contribution to Ethnography, comprising very numerous portraits of natives of the various German possessions in Africa, illustrations of their utensils and weapons, and descriptive letterpress accompanied by statistical tables. The collections here described were exhibited at the German Colonial Exhibition held at Treptow in 1896.

German Colonies.

Kolonial-Handels-Adressbuch 1898. Herausgegeben von dem Kolonial-Wirtschaftlichen Komitee. Berlin: E. S. Mittler & Son. Size $11 \times 7\frac{1}{2}$, pp. 78. *Maps.*

A directory of the German colonies, giving the names and addresses of business firms in each colony, of the chief export-houses in Germany, and a variety of useful information and commercial maps.

List of Animal Genera.

Sherborn.

Explanation of the Plan adopted for preparing an "Index Generum et Specierum Animalium." By C. Davies Sherborn. [From the *Proceedings* of the Zoological Society of London, June 2, 1896.] Size $9 \times 6\frac{1}{2}$, pp. 6.

Mountain Ascents. *Alpine J. 19* (1898): 48-54.

Freshfield.

The Highest Climbs on Record. A Note by Douglas W. Freshfield.

Comments on Sir Martin Conway's article on Mountaineering in the 'Encyclopedia of Sport,' including a discussion of the ascent of Kabru by Mr. Graham to 23,500 feet in 1883.

Petermanns Mitteilungen—Index.

Inhaltsverzeichnis von Petermanns *Geographischen Mitteilungen*, 1885-1894. (10 Jahrestände und 9 Ergänzungsabände.) Nebst 5 Karten. Gotha: Justus Perthes, 1897. Size $11 \times 9\frac{1}{2}$, pp. 130. *Price 8s.*

No. IV.—APRIL, 1898.]

- Phonetic Transcription.** *J.R. Asiatic S.* (1898): 23-28. **Morris.**
 Alphabet for Languages not yet reduced to Writing. By Henry Morris.
 A suggestion for certain combinations of letters to reproduce sounds not yet reduced to writing. As in the R.G.S. system, no sign is given for *u* as in *fus*. With regard to both consonants and vowels, diacritical marks are freely used.
- Place-Names.** *Oesterreichische Monatsch. Orient* 23 (1897): 128-129. **Sax.**
 Entstehung und Wanderungen des Namens "Rumelien" von C. v. Sax.
 On the origin and changes of the name Rumelia.

NEW MAPS.

By J. COLES, *Map Curator, R.G.S.*

EUROPE.

England and Wales. **Ordnance Survey.**
 Publications issued since February 8, 1898.

1-inch—General Maps:—

ENGLAND AND WALES:—95, 282, 328, hills engraved in black or brown; also 30, 32, 44, 51, 73, 109 (revision), engraved in outline; and 261, 262, 356, 359 (revision), hills engraved in black or brown. 1s. each.

6-inch—County Maps (revision):—

ENGLAND AND WALES:—**Essex**, 10 N.E., S.W., S.E., 11 N.E., S.W., 13 S.E., 15 N.E., S.E., 23 S.W., 24 N.W., N.E., 25 S.E., 32 S.W., 35 N.W., S.W., S.E., 40 S.E., 42 N.W., 45 N.W., 52 N.W., S.E., 53 N.W., 57 S.W., 59 N.E., 60 S.W., S.E., 62 S.W., S.E., 63 S.W., 65 N.E., 66 N.W., S.W., 68 N.E., S.E., 69 S.W., 70 N.W., N.E., 71 N.W., N.E., S.W., S.E., 75 N.E., S.W., 76 S.W., 77 S.W., 78 N.W., 83 N.E., 84 S.W. **Hampshire**, 41 S.W., 50 S.W., 58 N.E., 63 S.W., 66 S.E., S.W., 68 N.E., 71 S.E. **Hertfordshire**, 41 S.W., 45 N.E. **Kent**, 8 S.E., 12 S.W., 16 N.E., 18 N.E., 20 S.E., 23 N.W., S.E., 29 S.W., 30 S.E., 39 N.W., N.E., 40 N.E., S.W., 41 N.E., S.W., 49 N.E. **Middlesex**, 2 S.W., 6 N.E., 13 S.W., 17 N.E., S.E., 22 N.E. **Northumberland**, 49 S.E., 50 N.W., 66 N.E., 78 S.E., 85 N.E., 86 N.E., S.E., 95 N.W., 101 S.W., 103 S.E., 104 N.W. **Surrey**, 11 N.E., 12 N.W., 13 N.E., 23 S.E., 24 S.E., 28 N.W., 31 S.E., 33 N.E., 34 N.W., S.W., S.E., 38 N.W., N.E., S.W., S.E., 45 N.W. **London**, 4 S.W., 7 N.E., S.E., 11 N.E., 14 N.E., 15 N.W.

25-inch—Parish Maps (revision):—

ENGLAND AND WALES:—**Cheshire**, XXIX. 7; LI. 5, 6. **Durham**, I. 11, 14, 15; II. 16; V. 10, 15; X. 13; XVI. 4; XVII. 4; XXII. 4; XLVA. 5; L. 8; LI. 2; LVI. 3, 4, 7, 12; LVII. 4; LVIII. 1, 5. **Essex**, XII. 3, 16; XIX. 2, 8; XX. 9; XXVII. 16; LXXXIII. 13; LXXXIX. 1. **Hampshire**, LXXV. 6; LXXXVI. 15; LXXXIX. 15; XC. 2, 14, 15; XCI. 5, 9; XCIII. 2, 4, 6, 8, 12; XCIV. 2, 3, 5, 7; XCV. 3, 4, 7, 8. **Hertfordshire**, III. 12; IV. 13; VII. 4, 12, 16; VIII. 5, 7, 8, 10, 13, 15, 16; IX. 5, 9, 14; XI. 12, 16; XII. 8, 12, 14; XIII. 5, 6, 8, 9, 11, 13, 14; XIV. 3, 9, 12; XXI. 6, 9; XXII. 4, 16; XXIII. 9; XXX. 5; XXXI. 1; XXXV. 7, 8, 11, 12, 14; XXXVI. 3, 6, 7, 9, 13, 14; XLI. 2; XLV. 1. **Kent**, XIX. 4, 8, 13; XXIII. 9, 16; XXXV. 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14; LVI. 3, 4, 9, 10, 11, 13, 15, 16; LXV. 2, 5, 6, 10; LXVI. 3, 7, 8, 12, 14, 15, 16; LXXII. 7; LXXIII. 1, 5, 7, 8, 10, 11; LXXXIV. 14. **Middlesex**, XXV. 12 (this county is now published complete revised). **Northumberland**, VI. 6, 7, 10, 13, 14, 15; IX. 8, 12, 14; X. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14; XI. 1, 2, 3, 5, 6, 7, 10, 13; XIII. 3; XV. 8, 12, 16; XVI. 5, 8, 9, 10, 11, 12, 13, 14, 15; XVII. 1, 5, 10, 15, 9, 13; XX. 4; XXI. 1, 2, 3, 4; XXII. 1; CII. 10; CVI. 4, 8, 11, 16; CVII. 5, 10, 15. **Surrey**, XII. 3; XIV. 9; XXXVII. 11; XLIII. 2. **Sussex**, X. 5, 7, 10, 11, 12, 13, 15, 16; XX. 8, 12, 16; XXXIII. 4, 7, 8, 11, 15, 16; XXXVIII. 4; XXXIX. 3, 6, 9, 12; XLVII. 3, 4, 7, 8, 11, 12, 16; LII. 1, 4, 5, 6, 7; LIII. 1, 4, 10; LX. 4; LXI. 5, 6, 8; LXII. 5, 9, 13, 16; LXIII. 1, 15, 16; LXXIV. 4, 8; LXXV. 1, 3, 4.

(E. Stanford, Agent.)

England and Wales. **Bartholomew.**
 New Reduced Ordnance Survey of England and Wales. Scale 1: 126,720 or 2 stat. miles to an inch. Sheet 8, Liverpool and Manchester. J. Bartholomew & Co., Edinburgh, 1898. Price 2s., mounted on cloth. Presented by the Publishers.

- Germany.** **Königl. Preuss. Landes-Aufnahme.**
Karte des Deutschen Reiches. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme 1897. Sheets: 380, Iserlohn; 430, Köln; 457, Bonn. Scale 1: 100,000 or 1·7 stat. mile to an inch. *Price 1.50 mark each sheet.*
- Harrogate.** **Bartholomew.**
Plan of Harrogate. Scale 1: 7920 or 8 inches to a stat. mile. Environs of Harrogate. Scale 1: 253,440 or 4 stat. miles to an inch. By J. Bartholomew, F.R.G.S. W. H. Smith & Sons, London, 1898. *Price 1s., mounted on cloth.*
- Italy.** **Istituto Geografico Militare, Firenze.**
Carta d'Italia. Scale 1: 100,000 or 1·5 stat. mile to an inch. Sheet 28, Aosta. Istituto Geografico Militare, Firenze. *Price 1 li 50 centimes.*

ASIA.

- China.** **Petermanns Geographische Mittheilungen.**
Die Kiau-Tschou Bucht und Umgebung. Nach einer japanischen Karte von Schantung und der englischen Seekarte. Scale 1: 750,000 or 11·8 stat. miles to an inch. *Petermanns Geographische Mittheilungen*, Jahrgang 1898, Tafel 4. Gotha: Justus Perthes. *Presented by the Publishers.*
- Johnston.**
W. & A. K. Johnston's Map to illustrate the Chinese Question. Scale 1: 9,504,000 or 150 stat. miles to an inch. W. & A. K. Johnston, Edinburgh, 1898. *Price 1s., coloured. Presented by the Publishers.*
- Java.** **Verbeek and Fennema.**
Geologische Uebersichts- und Vulkan-Karte von Java und Madura. Nach B. D. M. Verbeek u. R. Fennema. Scale 1: 2,250,000 or 39·6 stat. miles to an inch. *Petermanns Geographische Mittheilungen*, Jahrgang 1898, Tafel 3. Gotha: Justus Perthes. *Presented by the Publisher.*

AFRICA.

- Africa.** **Service Géographique de l'Armée, Paris.**
Carte de l'Afrique. Scale 1: 2,000,000 or 31·1 stat. miles to an inch. Sheets: 7, Ben Ghazi; 9, 8^e Cruz de Tenerife; 55, Pretoria; 60, Pietermaritzburg. Service géographique de l'Armée, Paris. *Price 1 fr. each sheet.*
- German East Africa.** **Kiepert and Meisel.**
Karte von Deutsch-Ostafrika. Scale 1: 300,000 or 4·7 stat. miles to an inch. Sheets: D III, Kalula (Igonda); E IV, Iringa. Berlin: Geographische Verlagshandlung Dietrich Reimer (Ernst Vohsen). *Presented by the Publishers.*
These two sheets form part of Kiepert's large map of German East Africa. Sheet D III, Kalula, includes the country between lat. 5° 30' S. and 7° 0' S., and long. 32° to 34° E. Sheet E IV, Iringa, includes from lat. 7° to 8° 30' S., and long. 34° to 36° E. Descriptive notes, travellers' routes, locations of tribes, etc., are given, and each sheet is accompanied by explanatory letterpress.
- South Africa.** **Bartholomew.**
Bartholomew's Tourist's Map of South Africa. Scale 1: 2,500,000 or 39·4 stat. miles to an inch. J. Bartholomew & Co., Edinburgh, 1898. *Price 3s., mounted on cloth. Presented by the Publishers.*
This map is orographically coloured in five shades, indicating height from sea-level to above 4000 feet. It has been specially constructed for the use of tourists, and all means of communication have been brought up to date. It includes all South Africa south of 22° south lat. A plan of the country in the neighbourhood of Cape Town is given, as an inset, on an enlarged scale.
- Tunis.** **Service Géographique de l'Armée, Paris.**
Carte topographique de la Tunisie. Scale 1: 50,000 or 1·6 stat. mile to an inch. Sheets: IX., Cape Bon; XVI., Kelibia; LXXXI., El Djem. Dressé, gravé et publié au Service géographique de l'Armée, Paris. *Price 1 fr. 50 c. each sheet.*

AMERICA.

- Canada.** **Johnston.**
W. & A. K. Johnston's Map of the Klondike Goldfields. Scale 1: 2,851,200 or 45 stat. miles to an inch. W. & A. K. Johnston, Edinburgh, 1898. *Price 1s., coloured. Presented by the Publishers.*

GENERAL.

The World.

Andree.

Andrees allgemeiner Handatlas, 126 Haupt- und 190 Nebenkarten auf 186 Kartenseiten, nebst alphabetischen Namenverzeichniss. Vierte, völlig neubearbeitete, stark vermehrte Auflage, herausgegeben von A. Scobel. Vörlauf und Leipzig: Verlag von Veitbagen & Klasing, 1898. Part i. Price 50 pf.

This is a new and enlarged edition of this well-known atlas. When completed, it will contain 126 principal maps, 136 smaller maps, and 186 insets, and will be furnished with an index. It will be published in fifty-six weekly parts, each of which will cost sixpence. The present issue contains maps of Eastern Asia and the north-east portion of the United States. In the map of Eastern Asia, the recent work of Prince Henri d'Orleans, in the region of the upper Mekong, has not been made use of.

PHOTOGRAPHS.

India.

Waddell.

Three photographs of Kanchanjanga, and the neighbouring ranges of Nepal, etc., taken by Surgeon-Major L. A. Waddell. (1) Westward panorama from Semo or Semarum pass, in Nepal; (2) Kang La pass, from the west; (3) View of Kanchanjanga range, from Darjiling. Presented by Surgeon-Major L. A. Waddell.

On these three photographs the donor has written notes by which the several peaks can be identified.

Novaya Zemlya, etc.

Pearson.

An Album containing fifty-nine photographs of Waigats, Dolgoi Island, and Novaya Zemlya, taken by Henry J. Pearson, Esq., 1897. Presented by Henry J. Pearson, Esq.

This album, in addition to views of scenery, as will be seen by the accompanying list, contains many photographs that will be of interest to botanists and naturalists.

(1) Ship in floating ice; (2) Ice in Dolga bay, from s.s. *Laura*, 2-5 a.m. on July 7, 1897; (3) Island in Dolga bay, Waigats, west side; (4) The same, centre; (5) The same, east side; (6) Ancient Samoyed holy place, Dolga bay; (7) Stint lake, 2 miles inland from Dolga bay; (8) Interior near Dolga bay, Waigats; (9) Cape Greben, Waigats; (10) The same, nearer view; (11) Ice-ground rock near Cape Greben; (12) Modern holy place, Cape Matiusele, Waigats; (13) Driftwood, Cape Matiusele; (14) Shore-lark's nest, Waigats; (15) Peregrine's nest, Waigats; (16) The same, nearer view; (17) Rough-legged buzzard, Waigats; (18) Dotteral's nest, Waigats; (19) Red-necked phalarope's nest, Waigats; (20) Little stint's nest, Dolgoi island; (21) Little stint on nest, Waigats; (22) Red-throated diver's nest, Dolgoi island; (23) *Saxifraga*, Waigats; (24) *Matricaria inodora*, Waigats; (25) *Primula*, Waigats; (26) *Ventrium*, Waigats; (27) Habarova; (28) Old church at Habarova; (29) New church at Habarova; (30) South-west coast of Dolgoi island; (31) Samoyed grave, Dolgoi island; (32) Samoyed grave, Dolgoi island; (33) Head of Belutchia bay, Novaya Zemlya; (34) Goose Land, Novaya Zemlya; (35) Nameless bay; (36) Brunnich's guillemots, Nameless bay; (37) North coast of Matochkin Shar, near Cairn bay; (38) Cairn bay; (39) Samoyed houses at Cairn bay; (40) Samoyeds at Cairn bay; (41) Novaya Zemlya, seen from elevation of 2000 feet on Lutk's Land across Matochkin Shar; (42) The same: view of glacier, ship, and Shar; (43) Farassorra river, $\frac{1}{2}$ mile from sea, Matochkin Shar; (44) Pilot's grave, Rosmysloff's expedition, 1768; (45) Rosmysloff's winter house, Seal bay, 1768; (46) Rosmysloff's winter house, Wood cape, 1768; (47) Head board, believed to be that over pilot's grave, 1768; (48) Belushja bay; (49) Heap of debris 100 feet high, Belushja bay; (50) The same, nearer view; (51) *Silene acaulis*, Belushja bay; (52) Samoyed camp at mouth of Notschujew river, Matochkin Shar; (53) North-east part of Bear bay glacier; (54) Bear bay glacier on right, ancient moraine on left, river from upper glacier in centre; (55) Valley to north of Bear bay glacier, with glacier at its head; (56) Ibis glacier from the sea; (57) Side view of Ibis glacier, showing lateral moraine; (58) The same, nearer sea; (59) Ibis glacier from s.s., face 50 feet above water.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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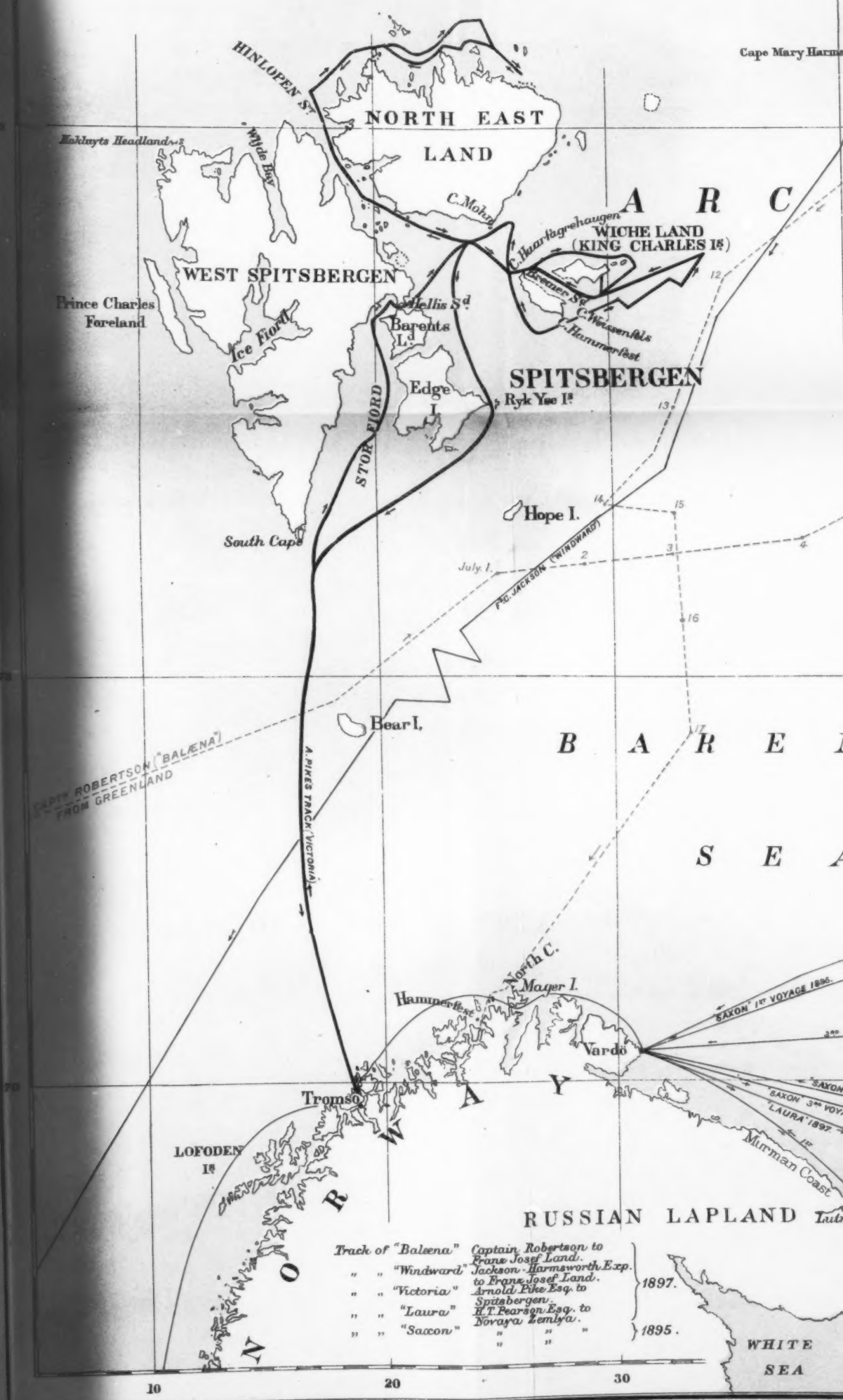
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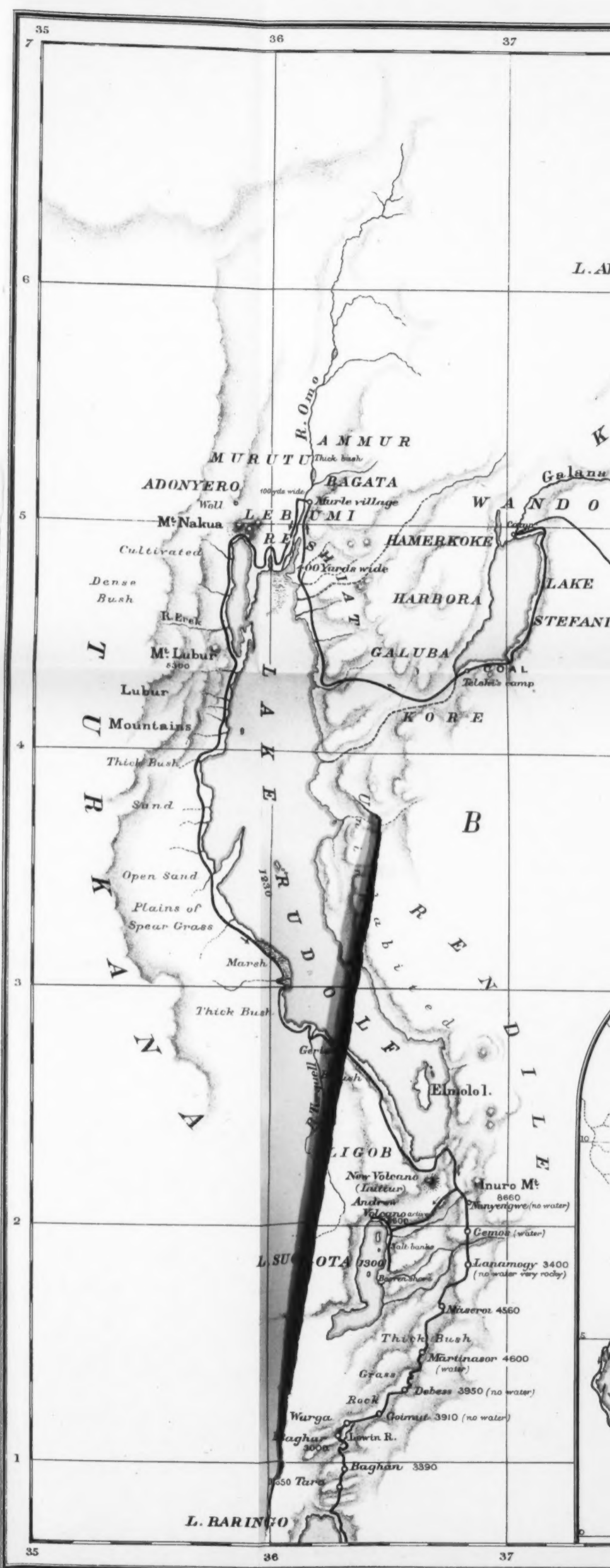
ROUTES in the SPITSBERGEN - NOVAYA ZEMLYA SEAS.

1895 - 1897.

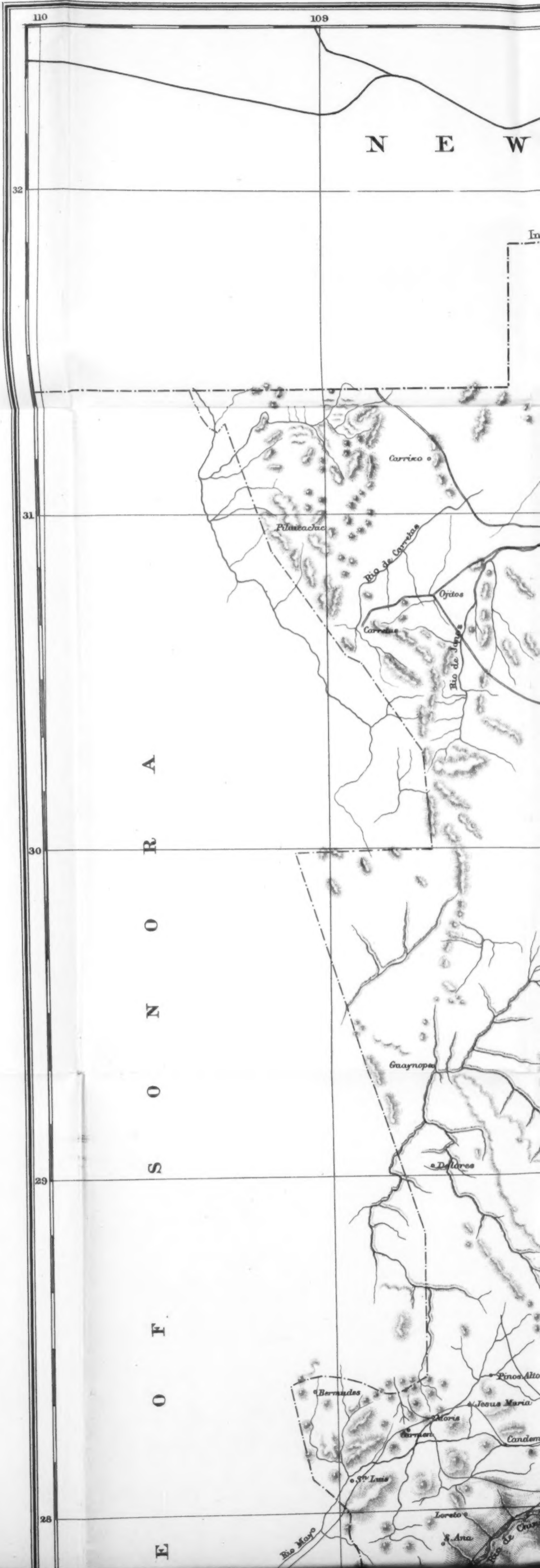


Track of "Balena"	Captain Robertson to Franz Josef Land.	} 1897.
" " "Windward"	Jackson - Harmsworth Exp. to Franz Josef Land.	
" " "Victoria"	Arnold Pike Esq. to Spitzbergen.	
" " "Laura"	H.T. Pearson Esq. to Novaya Zemlya.	
" " "Saxon"	" " "	









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San Luis
Loreto
Santa Ana
Rio Mayo
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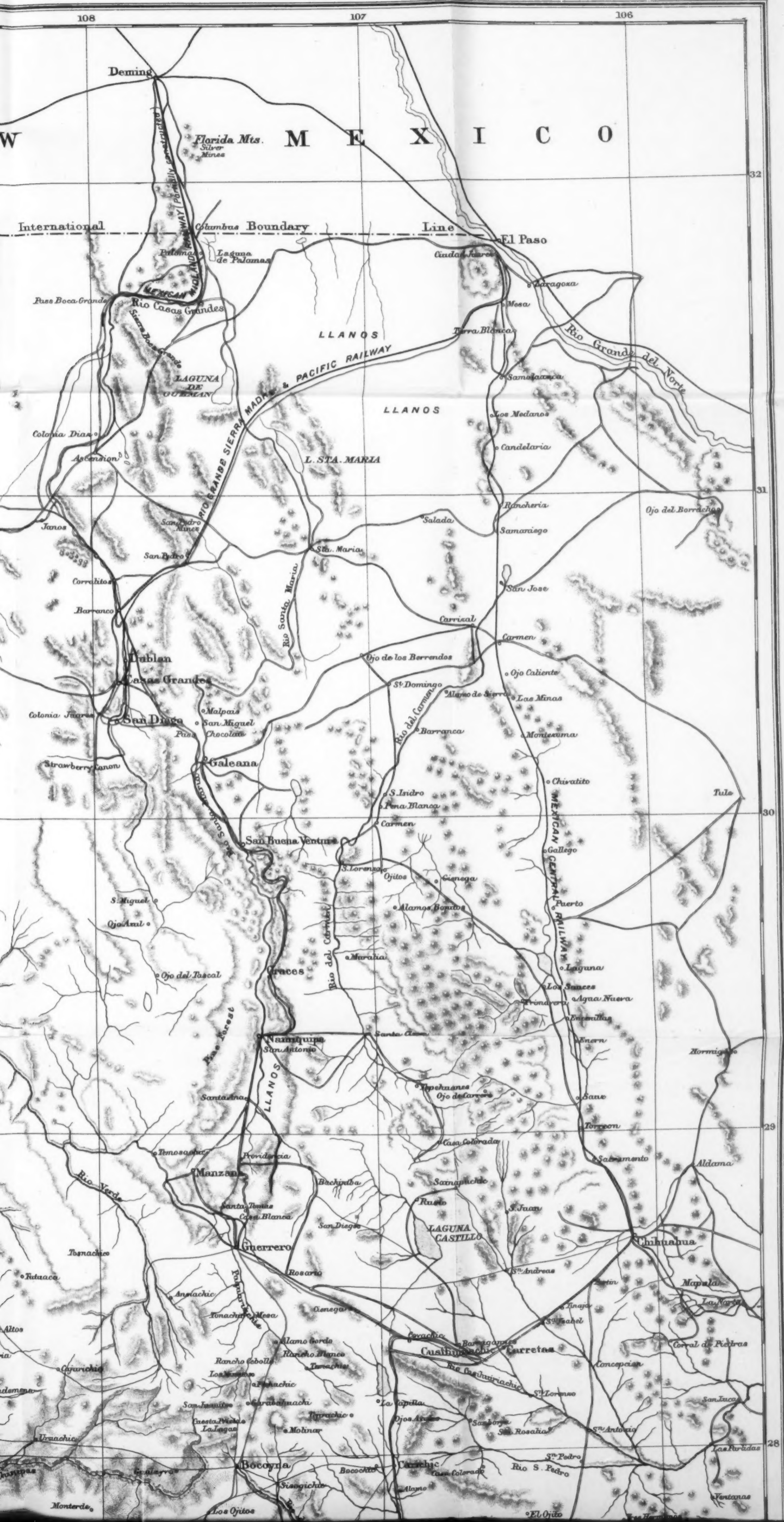
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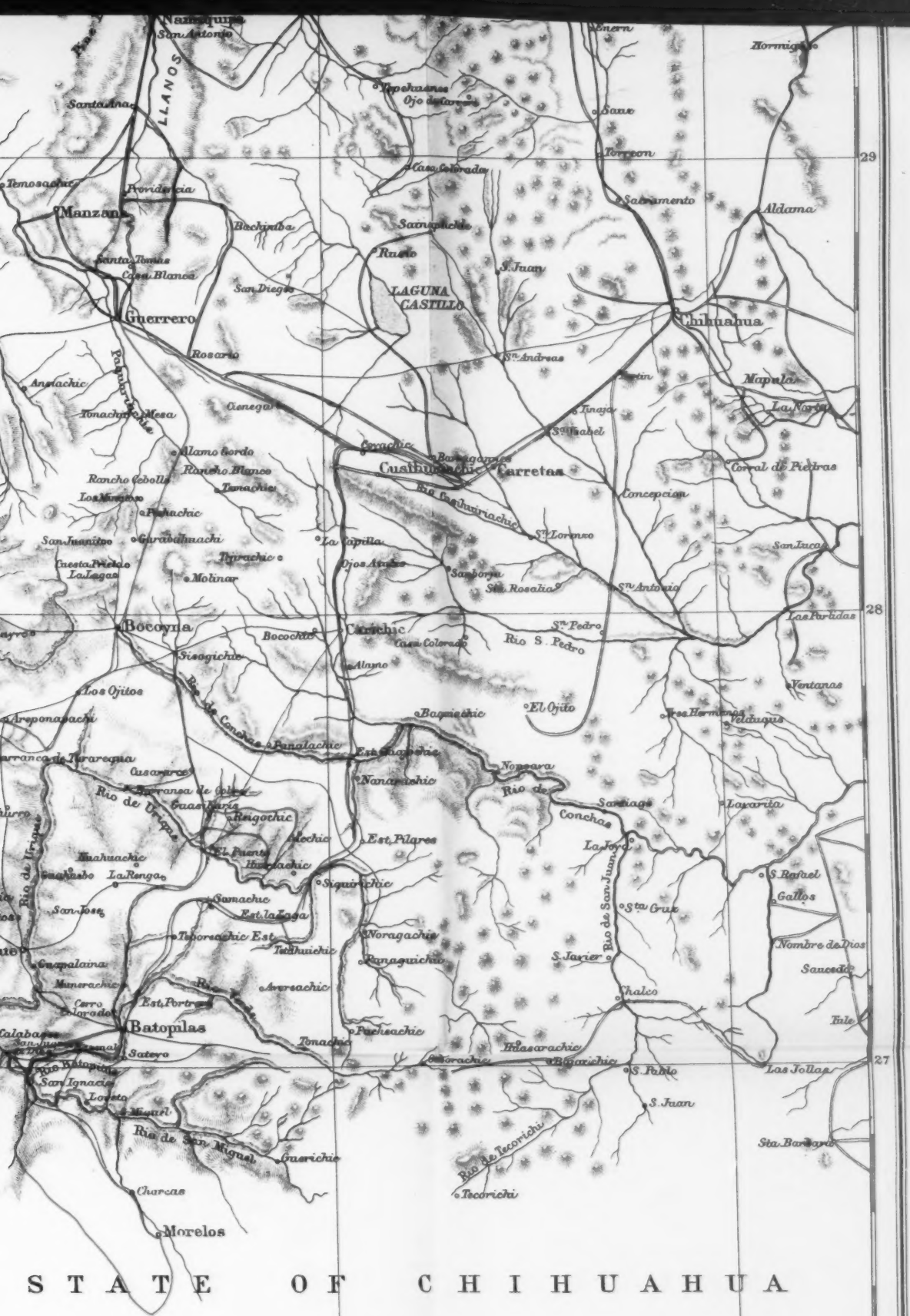
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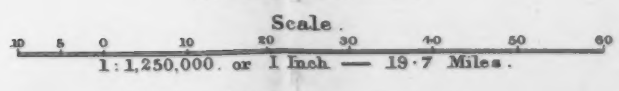
GULF OF CALIFORNIA

STATE OF SINALOA

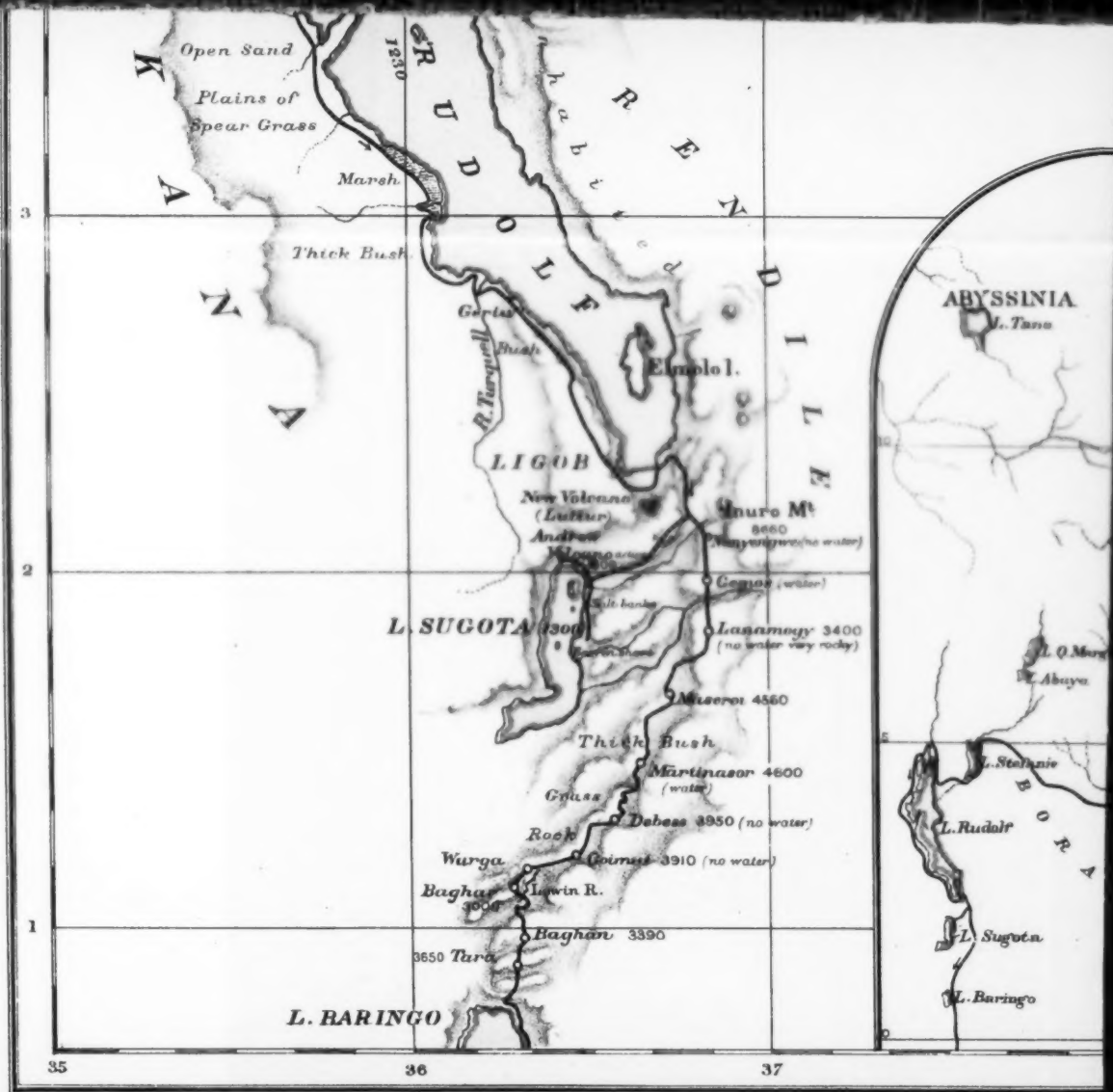


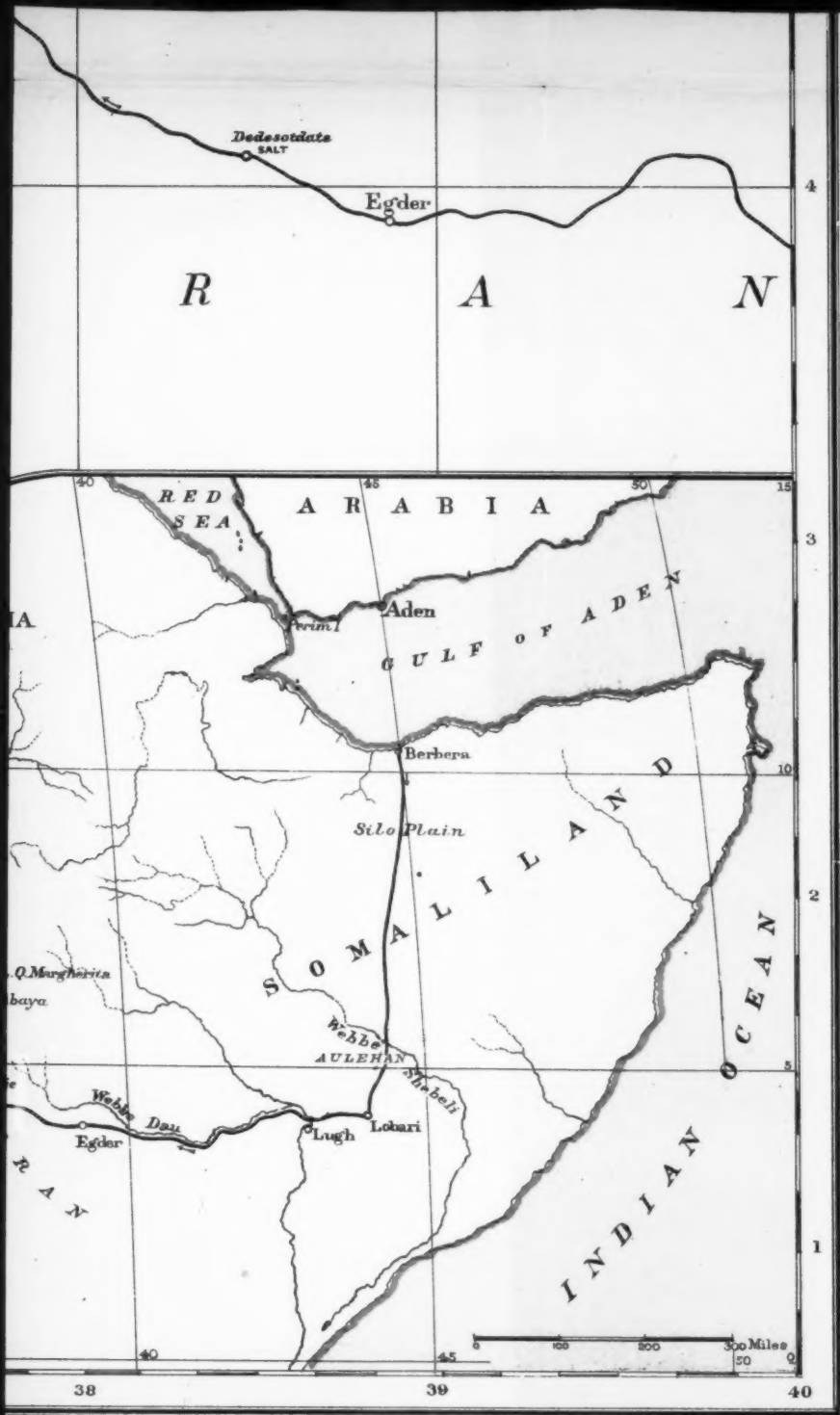
A SECTION
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NORTH MEXICO

Showing the Journeys of
J. GURDON L. STEPHENSON, F.R.G.S.
 and
A. KRAUSS, F.R.G.S.
 1897.



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